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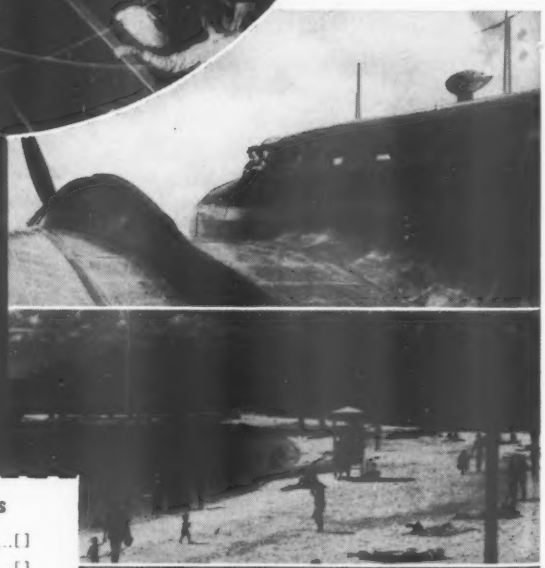

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TRIAL flights of the B-36, world's biggest bomber, brought out a special landing problem. With its 278,000 pounds pin-pointed on two 110-inch tires, the B-36 couldn't use ordinary runways.

Convair engineers had been studying alternate tire designs for some time. The test flights focused attention on the B. F. Goodrich proposal of Type VII tandem twin tires.

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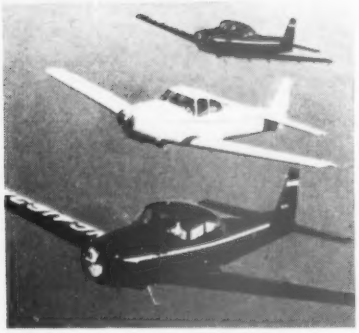

THE COVER: Ryan Navions in flight along California coast. Photo by Ross-Pix.

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FLYING

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THE LAST WORD

Crossed controls don't necessarily result in a slip. In fact, with the nose held up and the throttle sufficiently open it is possible to climb with the plane in the attitude shown on FLYING's March cover . . . the *Cub* is neither slipping nor climbing, but is maintaining an even altitude—this being a widely-used trick among photographer-pilot teams to get action into what would otherwise be an unimpressive and ordinary straight-and-level picture.

PETER M. BOWERS
Aviation Photography
Seattle, Wash.

● Photographer Hans Groenhoff, who took the March cover photo, corroborates the opinion of his fellow lensman. Says Groenhoff: "The cover shows the airplane banking, but not turning. As a matter of fact, this was planned and discussed in the briefing of the pilot before take-off on our photographic mission. . . . I specifically instructed the pilot to hold the plane in a bank without going into a turn. This was accomplished by a combination of opposite rudder and increased power. Power was used to maintain constant altitude and to overcome the slip usually resulting from crossed controls. . . . This is a special maneuver used for photographic purposes, but it is not recommended for ordinary flying. . . ."—ED.

NEW ANGLES

Regarding "Airport Signposts" [April FLYING] I have some suggestions to make . . .

CAA recommends inverted "V" segments for increased visibility and to shed snow. It might be a good idea to make segments in two sections, on hinges. By painting one side white and the other black, they could be reversed when snow is on the ground to show black on white. Also, the wind sock could be reversible.

In connection with night flying, the white side of the segments could be painted with reflecting paint. . . . With a light above the wind sock, the runway and wind direction could be seen easily at night.

WILLIAM T. CROWDER
Houston, Tex.

CAA'S CAFETERIA COURT

"Blackjacking the Pilot" [FLYING, May] should stir up every private plane owner in the U. S. What we need is a democratic CAA and CAB, pushing private flying to a new high with fairness for all pilots. . . .

L. M. COE
San Fernando, Calif.

It seems to me that about the only way to fight unfair Government regulations is for some organization such as AOPA to assess each member a small sum, to be used in legal defense of any member threatened with unfair treatment. Personally, I would be glad to contribute to such a cause.

W. A. DARRAH
Chicago, Ill.

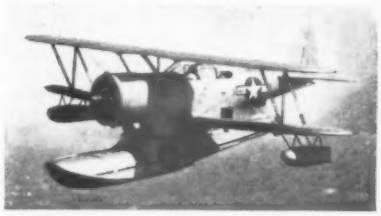
More articles like "Blackjacking the Pilot" would help private flying. . . .

L. L. MCCHAREN, M.D.
West Point, Miss.

THE DUCK

. . . In "Have You Seen" [FLYING, June] you picture several amphibians which you called Grumman planes. The bottom plane was the J2F-6, the *Duck*.

The fact is that the Grumman Corporation did *not* build a single J2F-6 during



the war. The J2F-6 was built by Columbia Aircraft Corporation of Valley Stream, N. Y. The name *Duck* was given to the Columbia-built planes; the J2F-1 to J2F-4, built by Grumman *prior* to the war, were not named.

WILLIAM H. MOESEL
Brooklyn, N. Y.

● Nevertheless (as FLYING said in June) four Grumman amphibians were shown in the picture. The *Duck* (J2F-6) was built by Columbia Aircraft Corporation, under license from Grumman, which designed it.—ED.

STALL WARNING (Continued)

. . . I think people who rely on stall warning devices are okay when everything runs smoothly, but when the gadget goes on the blink they are lost. That's the reason for accidents. . . .

I say give the students practice in stalls and recoveries. Make them do it till it comes out their ears. And leave the stall indicators where they belong: on the ground!

J. F. DELANEY
Jersey City, N. J.

Let's look at an accident report: John Hotrock, equipped with 15 hours flying time, buzzes his girl's house, leans out, looks back, waves, stalls, spins, and acquires a few regrets. Would a stall warning device have saved him?

. . . Let's look at John Ordinary Public, the Sunday Pilot. He buys a neat little job,

(Continued on page 76)

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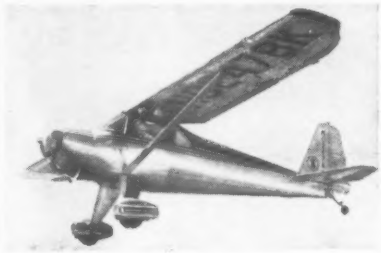
NOTES ON CIVIL FLYING

. . . **News of jets.** CAA has recently approved Allison Jet Model 400-C4 for commercial transport operation, and the USAF has authorized its release for that purpose. AF calls the engine J-33-21. GE, which developed it, calls it the I-40 . . . USAF's J-47A jet, designated TG-190A by GE, will be installed in the North American F-86A, designed for 650 m.p.h. . . . A Vickers *Viking* powered with two Rolls-Royce *Nenes* in place of Bristol *Hercules* engines has become the world's first jet-propelled airliner to fly.

. . . **Luscombe** has stolen a march on other lightplane manufacturers with production of the new 1949 *Silvaire Deluxe*. The 1949



model has been restyled, with redesigned seats, soundproofed cabin, stainless steel mufflers, airline-type ventilators, new type cabin heater. Price is $3,395 F.A.F.

. . . **NACA studies** of ice formation on airplanes during level cruising flight show maximum loss in propeller efficiency due to ice on propeller blades during trace-to-light-icing conditions was 19 per cent. Eighty-seven per cent of icing encountered resulted in propeller efficiency losses of 10 per cent or less. Ice formations on all components of the plane except propellers during one icing encounter, resulted in an increase of parasitic drag of 81 per cent. Control of the plane in this condition was "marginal."

. . . **Automatic GCA** is ready for flight-testing, according to Gilfillan Bros., electronics manufacturers. The set was developed by the Air Force's Watson Laboratories at Red Bank, N. J., and built by Gilfillan. It has an automatic tracking device which picks up the "pip" of an airplane as it turns onto final approach and transmits electronic signals to a set in the plane. The set in the plane indicates to the pilot his off-course error, and the error in rate of descent, by a "zero" needle. The pilot can correct manually, or connect the autopilot to guide the plane automatically to the runway by the electronic signals.

. . . **The cabin refrigeration** system in the Convair-Liner weighs only 80 pounds, yet gives a cooling capacity equal to the melting of five tons of ice in one day.

. . . **How safe** is airline travel? The National Safety Council recently gave awards to 23 U. S. airlines which completed 1947 without a passenger or crew fatality during the year. American and Northwest have flown more than one billion passenger miles since their last fatal accident. Here are some other records: Colonial, 17 years since last fatal accident; Inland, 16 years with no fatal accident; Northeast, 14 years; Mid-Continent, 13 years since last fatal accident; Continental, 12 years; Delta, 12 years; Chicago and Southern, 11 years; Braniff, eight years; Northwest, five years; Panagra, four years; National two years.

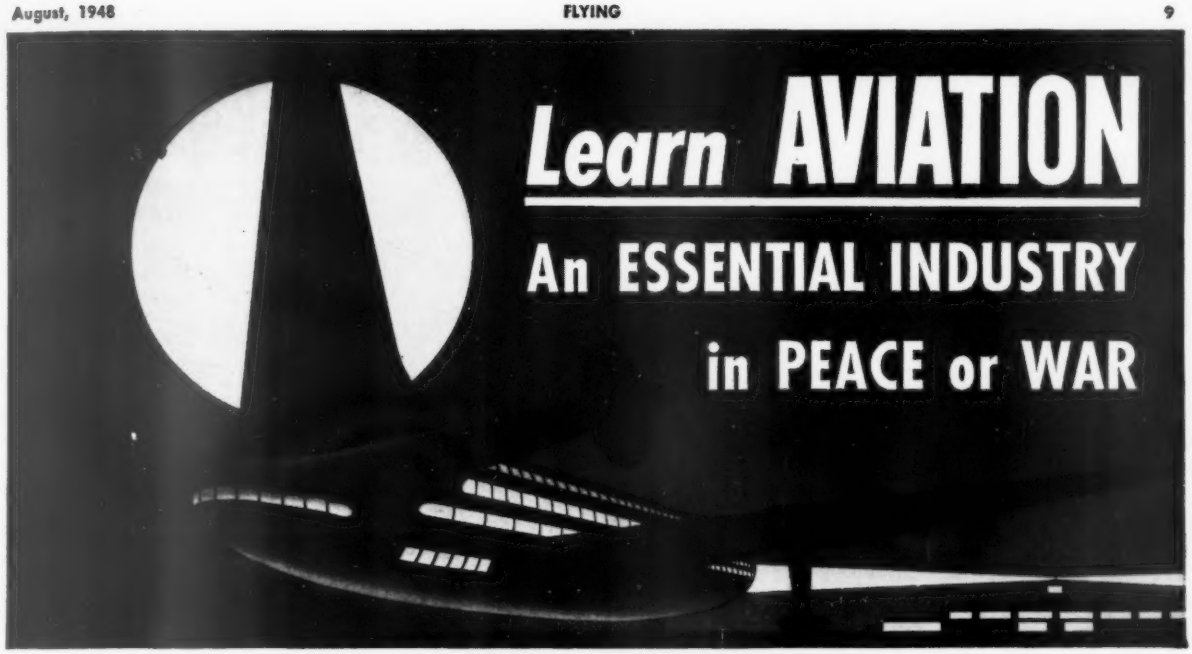
. . . **Flying Doctors** of California is the latest aviation organization. The medicos organized April 3.

. . . **The low-cost omni receiver** problem for lightplanes may be solved with the recent award of a contract by CAA to National Aeronautical Corporation (Narco). The contract calls for development of a light-weight, low-cost omni-direction beacon receiver to sell for around $400. Lowest price equipment today is well over $1,000.

. . . **Lightplane travel** to Mexico is being streamlined even further. A letter from the Mexican Consul General says that special flying permits from Mexican consuls are no longer required. All private planes will be cleared at the border if each passenger possesses a tourist card.

. . . **A robot reservations** system has been developed by International Telephone and Telegraph Corporation. Called "Intelex," it works like a dial phone switchboard but

is geared to handle the more complex problem of reservations. Teleprinter messages from any point may be connected with the Intelex system which will automatically actuate the "mechanical brain" and send back an immediate answer by teleprinter.



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AIRviews

It is plain that air freight's glamor days are over. "Rushing serum to Nome" is no longer front page news. Today, every hour witnesses emergency deliveries of some kind by the nation's carriers of air freight.

However, such emergency shipments have ceased to be the vital part of the picture. Now the backbone of air freight is the leading merchants and industrial firms who have carefully analyzed their costs and have determined that the use of air freight for normal shipments is currently *saving them money!*

In arriving at this conclusion, the seller or distributor of goods is bound to consider several factors. The basic factor, of course, is *speed.* Air freight's swiftness permits the catching of favorable markets . . . the wide distribution of goods in a matter of hours . . . the ability to keep customers happy and well stocked . . . and savings on inventory, interest-in-transit, and warehousing charges.

Then, too, there are the factors of cleanliness, of reduced cost in packaging and handling, of less loss through breakage. All these factors, plus speed, add up to lower costs . . . better service.

Today, air freight has expanded to such an extent that it has become available to many businesses whose leaders have not yet had a chance to investigate thoroughly its manifold advantages. The fact that many internationally successful industries and merchandising organizations are now using air freight so extensively presages an increasing number of air freight users, for which we in the aviation industry must be prepared.

Donald W. Douglas

PRESIDENT
DOUGLAS AIRCRAFT COMPANY, INC.
SANTA MONICA, CALIFORNIA

MILITARY NEWS

. . . **Air Commodore Frank Whittle** has received an award which any American inventor could envy. The British Government has given him $400,000 tax free for his

work in the development of jet propulsion. Whittle had claimed nothing for his work because he was serving as a British officer at the time. He had previously turned down $192,000 when Power Jets, Ltd., his company, was taken over by the government.

. . . **Military Air Transport** Service, the new organization which consolidates the Air Transport Service and NATS, is now operating directly under the Chief of Staff, U. S. Air Force, and commanded by Maj. Gen. Laurence S. Kuter, headquartered in Washington.

. . . **Flight training** is being given to 650 college graduates by the Navy. They will have the opportunity to enter the Regular Navy as commissioned officers and to receive 18 months of flight training. Naval Reserve officers can apply for the new program if they have not previously failed any military flight training program. Each officer appointed will attend an indoctrination course of one to four months, then will enter flight training. He must agree not to resign from Naval service for two years after completion of flight training.

. . . **Northrop Aircraft** is building a new three-engined *Raider* for military use. The transport will be bigger and more powerful than the commercial *Pioneer* transport which inspired the *Raider* design. Orders have been received for 23 of the new planes which are designed for rugged, short-field work.

. . . **Prone-flying pilots** in future military planes may use a new control system recently designed by USAF. Two control arms are provided, one on each side of the pilot's body. Handgrips are placed at the end of each control arm. The assemblies are adjustable for different arm lengths. To activate controls, the control arms move longitudinally, vertically and laterally. Other control units such as throttle, trim-tabs, propeller control and so on may also be mounted on the control arms. "Pilots will tire less on long missions as a result of the comfortable support of the pilot's arms," the engineering report says.

. . . **Strategic Air Command,** under General George C. Kenney, has moved its headquarters from Andrews Air Force Base, Md., to Offutt Air Force Base, Omaha, Neb. Offutt AFB was selected because of its strategic location near the geographical center of the United States.

. . . **American troops** in Europe have been told to watch for "unconventional aircraft" including "flying discs" according to the Air University Dispatch.

. . . **Rear Adm. John W. Reeves, Jr.,** U. S. Navy, formerly commander of NATS, has assumed new duties as chief of Naval Air Training, Pensacola. Admiral Reeves' new nationwide command trains all naval aviators including Marines and a few Coast Guard and Latin American aviators.

. . . **Convair** is building a new high-performing patrol flying boat, powered by four prop-jet engines. Designated the XP5Y-1, the new plane is the largest flying boat ever built by the company. It will have quick take-off, high speed, probably will fly early next year.

. . . **New types of chevron** and cap, collar, and lapel insignia for enlisted men and new metal buttons for all personnel have been approved by the Air Force. AF chevrons

will be four inches wide, with silver-gray stripes on a dark blue background. The chevrons will be in the shape of a "V" with the arms curved outward. The "V" will point downward and will have a silver-gray star on the dark blue background at the bottom. The Air Force, however, will not switch to blue uniforms this year.

CAA Proposed It!
NAS Adopted It!
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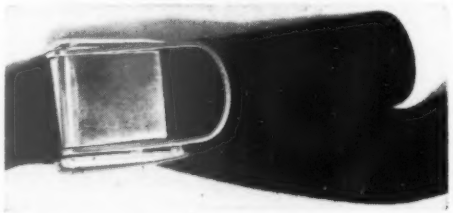

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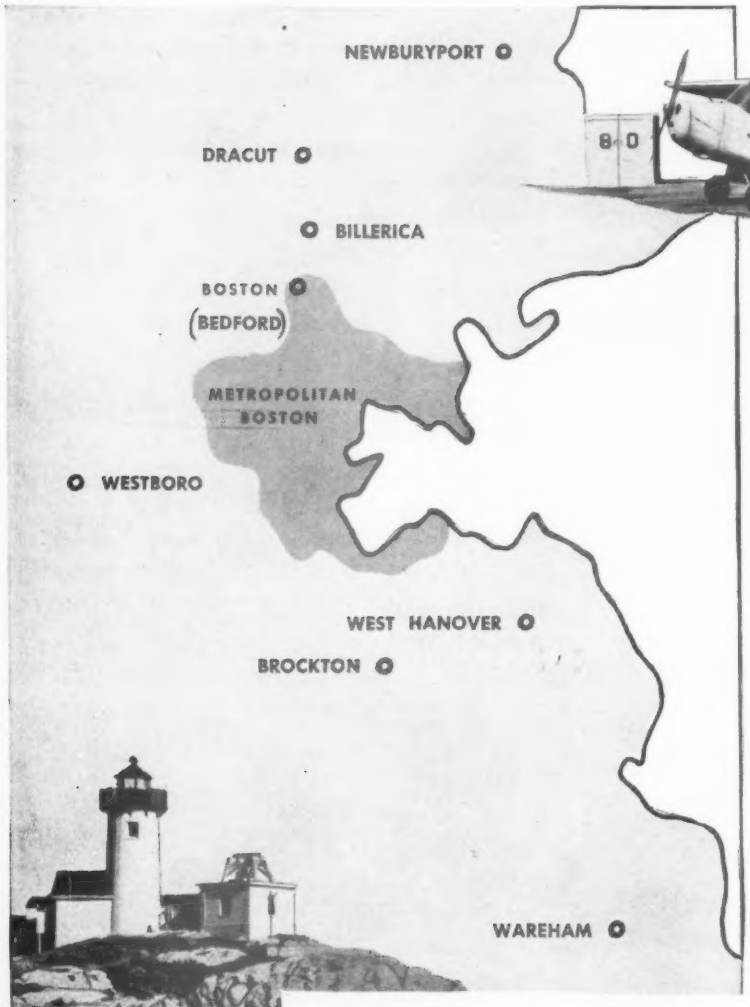

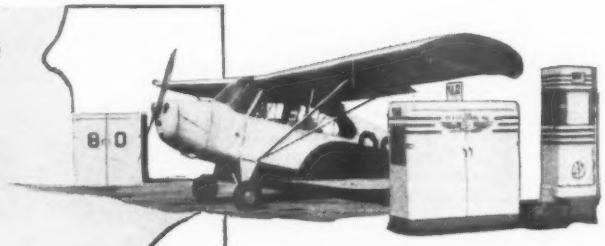

1. Newburyport, Mass.
Plum Island Flying Service—two sod runways 2,500′ and 3,000′. Maintenance & repair, hangar space, rental service, school. Near vacation center.

2. Dracut, Mass.
(2 miles from Lowell) Reebal Flying Service. Two sod runways: 2,400′ and 1,500′. Maintenance and repair, school, hangar space, restaurant.

3. Billerica, Mass.
Shawsheen Pines Airport—one 3,500′ asphalt treated runway. Maintenance, school, hangar space, restaurant, charter service.

4. Boston, Mass. (Bedford)
Hanscom Airport — East Coast Aviation Corp., Atlantic Aviation Corp. and Air Holidays, Inc. Class 4 Airport with radio, beacon, lighted and paved runways. Sales and service of executive type aircraft. Hangar space, restaurant, charter service.

5. Westboro, Mass.
Lynde Flying Service—Two sod runways 1,500′ and 1,700′. Sales and service, hangar space, flight training school.

6. West Hanover, Mass.
Clark Airport, East Coast Aviation Corp. Three asphalt treated 2,500′ to 3,500′ runways. Maintenance, hangar space, school.

7. Brockton, Mass.
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8. Wareham, Mass.
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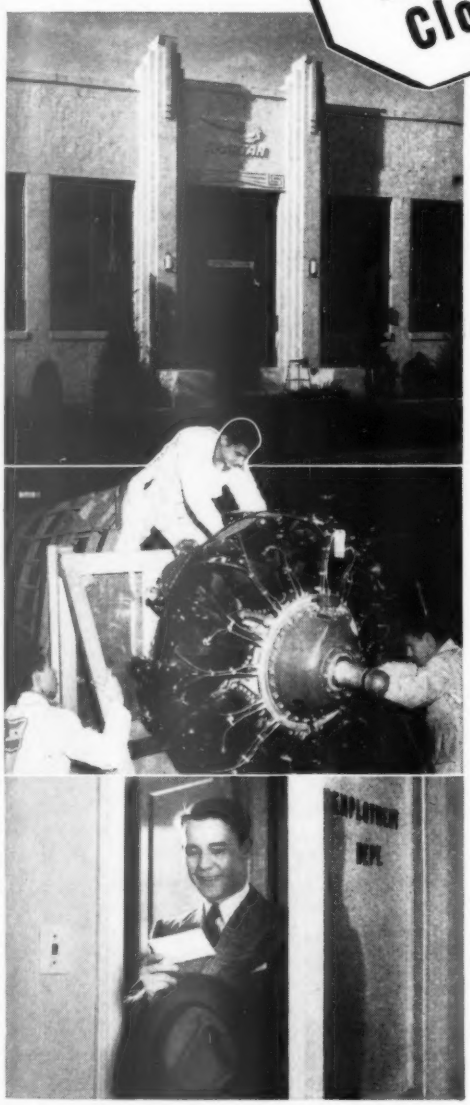

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Visiting jobs in three states during *one* day by 4-place Bonanza is not unusual for key men of Megarry Brothers, bridge and road builders of the Northwest. "Delays from breakdowns are cut to hours by flying our men and parts direct to job," they say. "One superintendent covers several jobs rather than one, as formerly." Economical—operating costs can reach as low as 1¢ per passenger mile.

Honeymooners who buy their ring from Mack Lowry, the "flying jeweler" of Akron, Ohio, get a 300-mile wedding trip in his Bonanza—free. "Merchandising gold mine," says Mr. Lowry. "I use my Bonanza to fly customers to Cleveland wholesale houses for merchandise inspection. Owning this fast, comfortable Bonanza pays off!"

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BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

What's Right with the Airport Program?

CAA official answers critics of nation's $500,000,000 airport plan.

By H. ARTHUR HOOK, *Assistant Administrator for Airports, Civil Aeronautics Administration*

FOR over two years, CAA has been criticized for its administration of the Federal Airport Program. Some state and city officials have carped at the Act and its Administration.

"The program's too slow getting started," some have charged.

"Regulations are too strict," others insist.

"The Government doesn't have the right to keep long-term interest in ports partially constructed with U. S. funds," is a frequent cry.

Not all the criticism is unjustified. We've changed numerous regulations, procedures and methods to conform with suggested improvements.

Here's an up-to-date story on the Federal Aid Airport Program. Here's what we hope to do—what has been done—and what our current situation is.

No one protests that the basic reasoning of the bill is wrong. We must have a well-distributed system of airports to meet a nation's growing needs.

Airport construction, except for military use, stopped during the war years. Many of the so-called "smaller fields" were closed down entirely. Others were ploughed under for victory gardens or were just left to the weeds. In spite of the large number of military fields constructed across the land, we had few more airports *after* the war than we had *before*. As recently as 1939 this country could not boast of a single Class 4 or larger airport, a field for instance the size of Washington National Airport.

One might surmise that the many military fields constructed during the war years could be used today as large municipal fields. They did help the situation to some extent.

But most military fields were too far away from centers of transportation to be of use. The inevitable trend toward close-in airports had already started.

The utility of fast air travel is lost if passengers are forced to spend as much time getting to and from an airport as they spend in the air.

Commercial air travel expanded at the close of the war. Restrictions were lifted. New and faster airliners went into use. And private flying mushroomed under the stimulation of the G. I. Bill. But the airports of the country lagged far behind other develop- *(Continued on page 76)*

Unification is a Flop

Split authority and open quarrels between the Services help confirm the opinion of experts that Unification isn't working out.

★ ★

By MICHAEL H. FROELICH

Assistant Publisher of FLYING

IN RECENT MONTHS the public has been treated to a remarkable display of ill feeling between our armed services. These inter-service disagreements have served to highlight what experts predicted would happen even before the "unification" bill was enacted a year ago. There is one major fault with the act—it doesn't unify.

Under the existing act there has been neither unification of our military establishment, savings of large sums of the taxpayers' money as promised, nor even real military security to the country as a whole.

In short, unification so far is a flop, and has been so branded in the Congressional Record. Here is some of the evidence:

1. The criticism of the Joint Chiefs of Staff by the Congressional Aviation Policy Board for failure to have a coordinated and integrated plan of action.

2. The open fight over the 70-Group Air Force indulged in by the Secretary of Defense and the Secretary of the Air Force.

3. The open fight over the super-carrier proposed by the Navy, which was criticized by the Air Force.

4. The introduction into Congress of three Air Force bills which did not have the sanction of the Department of Defense. These bills involved appropriations of more than $1,000,000,000 and were reported to have been pressured through by the Air Force without administration approval.

5. The obvious undercurrent of bickering and petty jealousies which frequently flared up as the three services jockeyed for position in the national defense picture.

The basic trouble with "unification" is that there is no unification, there never has been unification, and the designation of the new setup as a unification act is erroneous. There is no all-powerful boss of the National Defense Establishment. Instead of two services—the Army and Navy—bickering and fighting and trying to outdo the other, we now have three—Army, Navy and Air Force.

There is strong sentiment in Congress to change the present act, though there can be no action until the next session. Sen. Wayne Morse of Oregon, a member of the Armed Services Committee, has given unqualified notice in the Senate that he will make passage of a new bill a major fight in the next session.

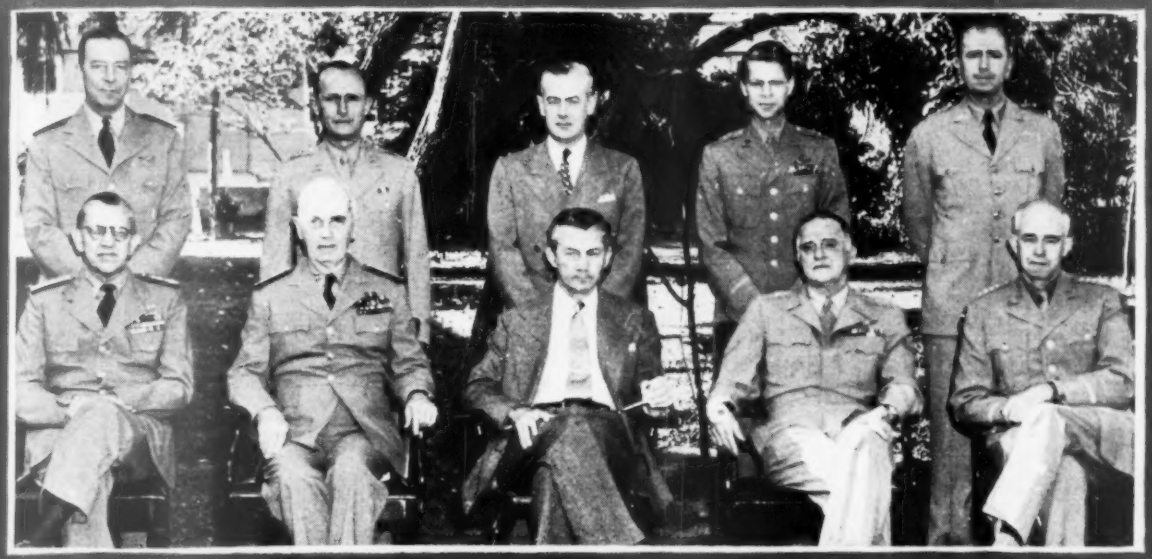
He proposes to merge the services rather than "unify" them. He would set up a Secretary of National Defense, a Chief of Staff, and assistant secretaries for Air Force, Army and Navy. The Secretary of Defense does not now have sufficient authority over these officials.

Senator Morse would also provide for a single office of procurement which would clear requests for funds through the Secretary of Defense. This would provide a necessary check upon the often exorbitant and uncoordinated demands of the separate services.

Many persons, of course, believe that time will iron out present difficulties. An act so sweeping and comprehensive could hardly begin to function efficiently overnight. Unification has already so coordinated and streamlined some purchasing functions that 65 per cent of the $3,000,000,000 worth of equipment and supplies for the services will be bought through single service purchase agreements in fiscal 1948.

Under these agreements, the Army, Navy and Air Force each are responsible for buying certain materiel for all three branches—an arrangement which not only simplifies and speeds up purchases but also is claimed to lower costs. Further streamlinings are under study, particularly those directed to formulating uniform contract and procurement forms and common inspection procedures. And additional progress is predicted as a result of the expected adoption of common nomenclature and indexing.

On the other hand, critics say that as written the Act is incapable of sustaining an efficient department. Particularly, they object to the fact that the act does not give Secretary Forrestal the power to hire and fire his secretaries. They feel that he can never work out of his legislative dilemma until the Act is revised so that its weaknesses are eliminated and replaced by a more workable *(Continued on page 70)*



After Key West conference called to settle disputes between Services, this official picture was taken. L. to R. (seated) are Adm. Louis E. Denfeld, Fleet Adm., William D. Leahy, Secretary Forrestal, Gen. Carl Spaatz, Gen. Omar Bradley, (standing) Vice. Adm. Arthur W. Radford, Maj. Gen. Alfred Gruenther, W. J. McNeil, Lieut. Gen. Lewis Norstad, Lieut. Gen. Albert Wedemeyer.

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(100 OFFICERS FROM THREE DEPTS.)

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ARMY
NAVY
AIR FORCE
} TWO REPRESENTATIVES FROM EACH

UNIFIED FIELD COMMANDS

SECRETARY OF THE ARMY
DEPARTMENT OF THE ARMY

SECRETARY OF THE NAVY
DEPARTMENT OF THE NAVY

SECRETARY OF THE AIR FORCE
DEPARTMENT OF THE AIR FORCE

NATIONAL MILITARY ESTABLISHMENT

The Air

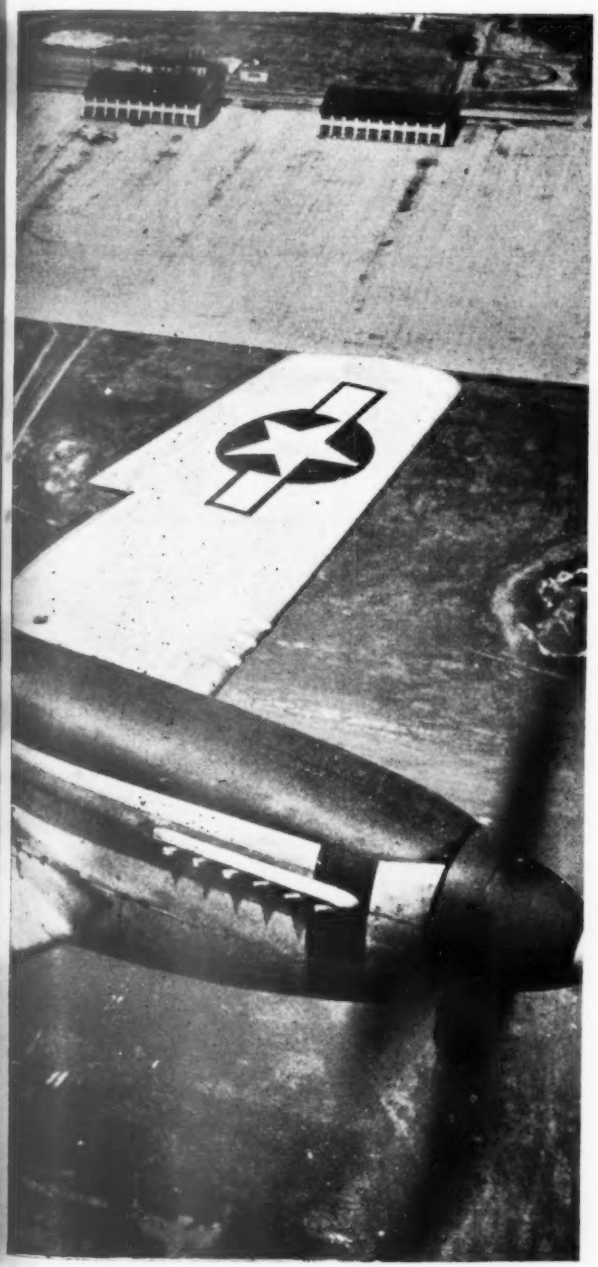
Briefing session for flyers of the 54th Fighter Wing of the Air National Guard, Marietta, Ga., is led by Capt. Charles C. Patillo.

By Col.
W. A. R. ROBERTSON
Chief, Aviation Group, National Guard Bureau

Mustangs of 155th Fighter Squadron, Tennessee National Guard, typify planes of the Air Guard which is also beginning to receive jets.

National Guard . . .

The Air Guard will add 24 fighter groups and three light bombardment groups to the U. S. air defense.



THE Air National Guard is rapidly becoming an air force in being. This summer over 16,000 officers and men will gather at flying fields in 35 states to conduct its first mass-scale post-war training maneuvers.

The Air National Guard has important new responsibilities. The Air Force has assigned overall air defense of the United States to the Air Defense Command, and the National Guard air defense plans are integrated with the overall plan. The Air National Guard has a two-fold mission:

First, as the Air National Guard of the United States, to provide a reserve component of the Air Force capable of rapid expansion to war strength, able to furnish air units fit for immediate service anywhere in the world, which, with the U. S. Air Force, will provide an M-Day Air Force capable of proper conduct of air defense, air offense, and joint action with surface forces for the fulfillment of the following:

a. To defend the critical areas of the United States against land, seaborne or airborne invasion.
b. To assist in covering the mobilization and concentration of the remainder of the reserve forces.
c. To participate by units in all types of operations, including the offensive, either in the United States or overseas.
d. Cooperating with other National Guard, Regular Army, Air Force and Reserve units in joint training involving aircraft and air equipment during field exercises and maneuvers and during armory training periods.

Second, as the Air National Guard of the several states, to provide sufficient organizations in each state, so trained and equipped as to enable them to function efficiently at existing strength in the protection of life and property and the preservation of peace, order and public safety.

The Air National Guard's responsibility in the defense of America in the air was made clear recently by Lieut. Gen. George E. Stratemeyer, Commanding General, Air Defense Command, when he stated that "the air units of the National Guard are almost two-thirds of the total fighter aircraft strength available to me in the event of an M-Day."

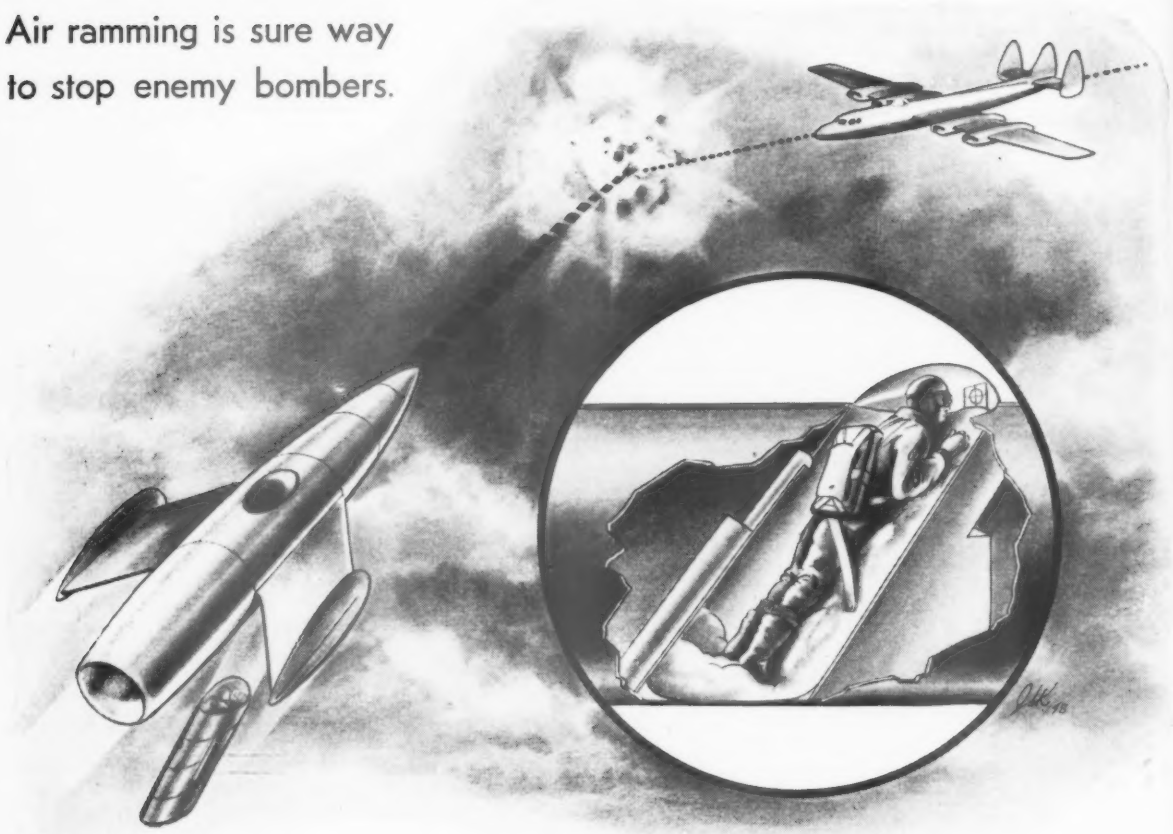
At present we are utilizing nine types of aircraft, including the P-51, P-47, A-26, C-47, AT-6, AT-11, L-5, L-16 and the L-17. Jet-propelled F-80s are now being delivered to four of our units.

The Air National Guard has been authorized 514 units to be located in all the states, District of Columbia, Puerto Rico and Hawaii. Of this number, 384 units have been Federally recognized and 52 more are being organized. Present plans call for all units to be Federally recognized prior to December 31 of this year. When the Air National Guard reaches total authorized unit strength, it will have 57,946 personnel in 12 wings, which include 24 fighter groups, three light bombardment groups and supporting units and two separate overseas fighter squadrons. The 24 fighter groups contain 72 fighter squadrons, and the three light bombardment groups have 12 light bom- *(Continued on page 68)*

XUM

The Tactics of Suicide

Air ramming is sure way to stop enemy bombers.



Ramming plane of future may contain pressurized pilot-ejection capsule, enabling pilot to escape before hitting an enemy bomber. Interceptor would have radar tracking, accurate homing devices.

By ROBERT W. MARLOWE

"WILL YOU VOLUNTEER for a suicide mission?" That question may be asked hundreds of American flyers in the event of a future war. If an enemy possesses supersonic bombers, possibly the only way to prevent complete destruction of U. S. cities will be through ramming missions by Air Force pilots.

Warfare in the immediate future could make the choice inevitable.

Given time, the Air Force expects to develop guided missiles which will home on their targets, making unnecessary the sacrifice of a pilot. Even today the Air Force is working on pilot-ejection mechanisms which will enable an interceptor pilot to aim his aircraft, stay with it until collision becomes inevitable, then parachute to safety while his plane crashes into attacking bombers.

But those devices aren't available now.

If the atomic bomb were employed against the U. S. within the next couple of years, one of the few ways to stop supersonic bombers would be through use of suicide planes.

The idea isn't new. It wasn't developed by the Japanese in World War II, although many persons believe the *Kamikazes* originated the suicide principle in modern aerial warfare.

Maj. John J. Driscoll, writing in a recent issue of the *Air University Quarterly Review,* traces the development of the air-ramming concept since the development of aerial warfare:

He recalls that "the earliest record of unquestionably deliberate ramming, and the first recorded aerial combat, occurred in 1914 when a Russian observation plane rammed a similar type German aircraft." And in the 1920s U. S. Naval tacticians advocated air rammings as a last resort.

World War II saw the suicide pilot emerge occasionally as a potent factor in air combat, though even the *Kamikazes* mostly flew standard, non-specialized aircraft and used haphazard tactics. Even so, they were able to deal destructive blows, according to Major Driscoll.

For example, the tally after the first few *Kamikaze* rammings of B-29s was: Jap airmen lost, 11; Jap aircraft lost, 16. U. S. airmen lost, 40; B-29s lost, four. Not bad—especially considering that the Japs used conventional aircraft.

Later, the Japs designed planes especially for suicide-bomb purposes. One of these was the *Sakura Oka-11* (the *Baka* Bomb) which was propelled by rockets in the tail assembly. Nose of the *Baka* resembled the warhead of a torpedo, and carried high explosive. The suicide pilot controlled the bomb in flight from a bubble canopied cockpit. Biggest drawback of the Oka-11 was its limited range (20 miles) and the vulnerability of its mother *(Continued on page 75)*

Versatile Grasshopper

Air Force's L-13 liaison plane is an aerial jack-of-all-trades.

Flying Jeep winterized for sub-zero operation (top) has red wing tips and tail surfaces to facilitate spotting in snow. Note cargo containers under wing (below).

Continued on the next page

Air rescue is a natural for L-13s. Radioed by walky-talky, plane parachutes supplies to a crew on ground.

VERSATILE GRASSHOPPER *continued*

CONVAIR'S angular L-13 liaison plane can do everything but tie the pilot's shoelaces. It's an observation, personnel transport, communication, photographic, cargo, wire-laying, courier and ambulance plane all wrapped in one neat all-metal package.

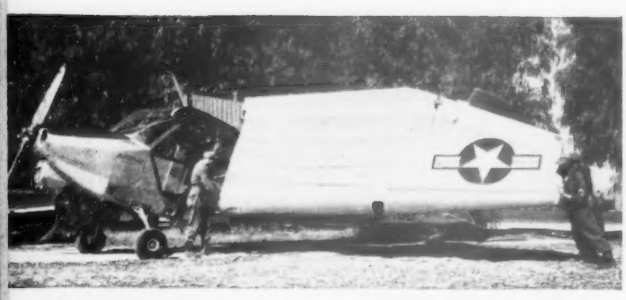
With full power and large flaps extended, the liaison craft takes off in 230 feet (wingspan of a B-36), lands at 43.5 m.p.h. in 227 feet.

Its 245-h.p. Franklin engine gives the L-13 (tentatively called the "Flying Jeep"—same as the wartime L-5) a cruising speed of 92 m.p.h. and a range of 368 miles.

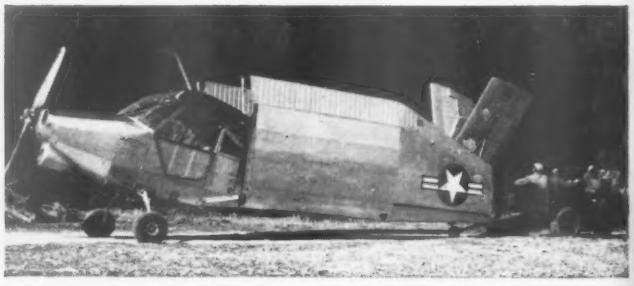
By carrying an auxiliary 50-gallon ferry tank, a pilot can stretch the range to 750 miles. Height is 8 ft. 5 in., length 31 ft. 9 in., and wingspan 40 ft. 6 in. With wings folded for towing or hauling, it measures a compact 80 inches in overall width. With its unconventional wings folded tightly along the fuselage, and with tread reduced and tail surfaces folded up, it will fit into a 2½-ton truck. Wheel axles can be rotated inboard, cutting the tread from 93 inches to 62. The axle will accommodate skis, and the landing gear can be replaced with floats.

Normal crew is three persons, but the cabin will accommodate six in an emergency. Useful load in emergency is 1,000 pounds, though under standard operating conditions the L-13 carries a pilot and 400 cargo pounds. Converted to an ambulance plane, it holds two litter patients, an attendant and a pilot.

Now undergoing extensive testing by Army Ground Forces, the L-13 can be towed as a glider at speeds up to 150 m.p.h., and then released to proceed under its own power in flight. Photos were taken at March Field Air Force Base, Riverside, Calif., where L-13s are in service with the 7th Liaison Squadron and Air Rescue Service Detachment 9. END

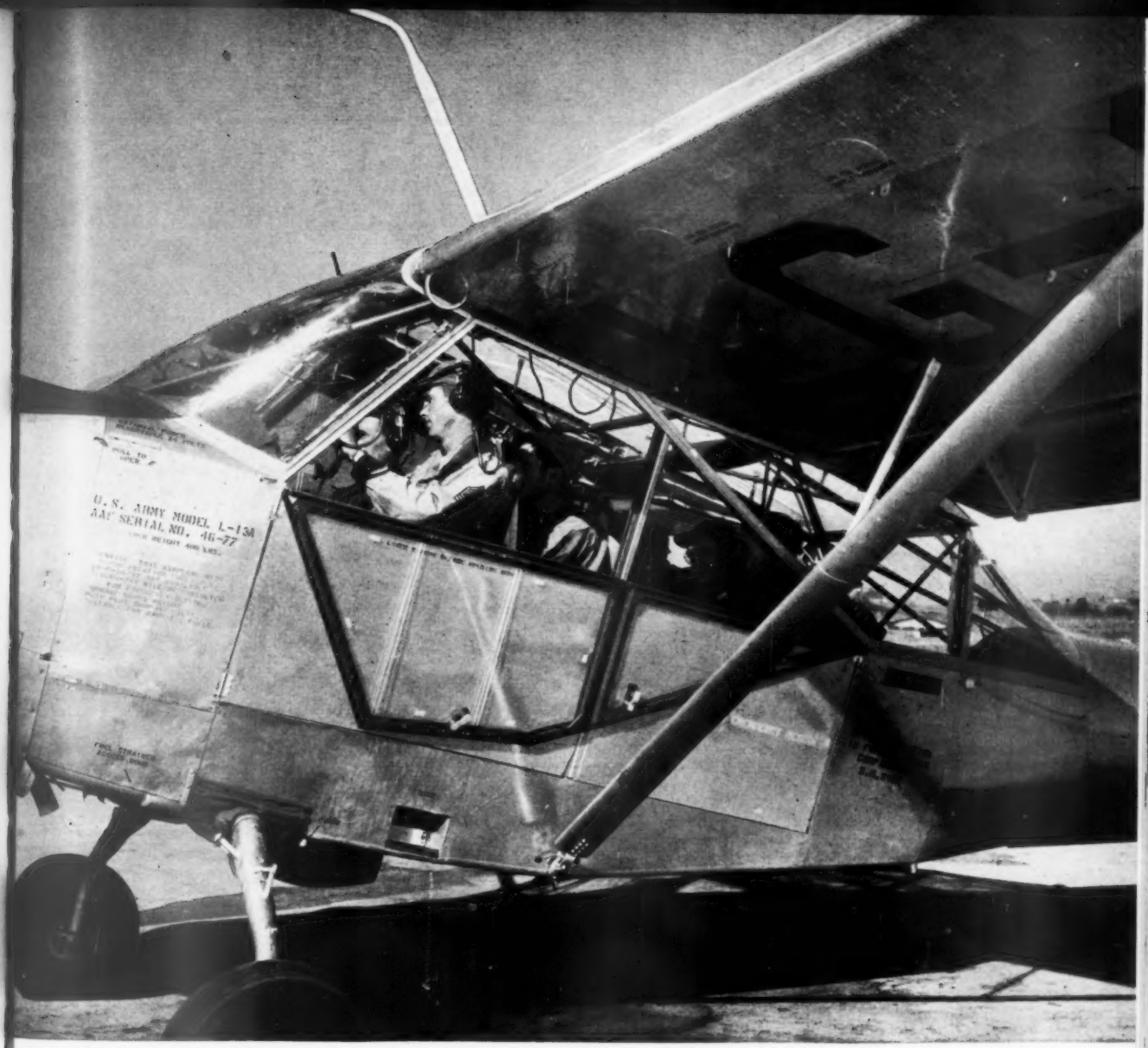


Folding wing, first ever built on a liaison plane, facilitates movement on roads. The L-13 can be towed prop first or tail first.



Jeep-propelled L-13 can be converted for towing in 15 minutes. Wing and horizontal stabilizer fold compactly along the fuselage.

Aerial ambulance is same old L-13 with co-pilot's seat removed. The cabin has space for two litter cases, an attendant and the pilot.



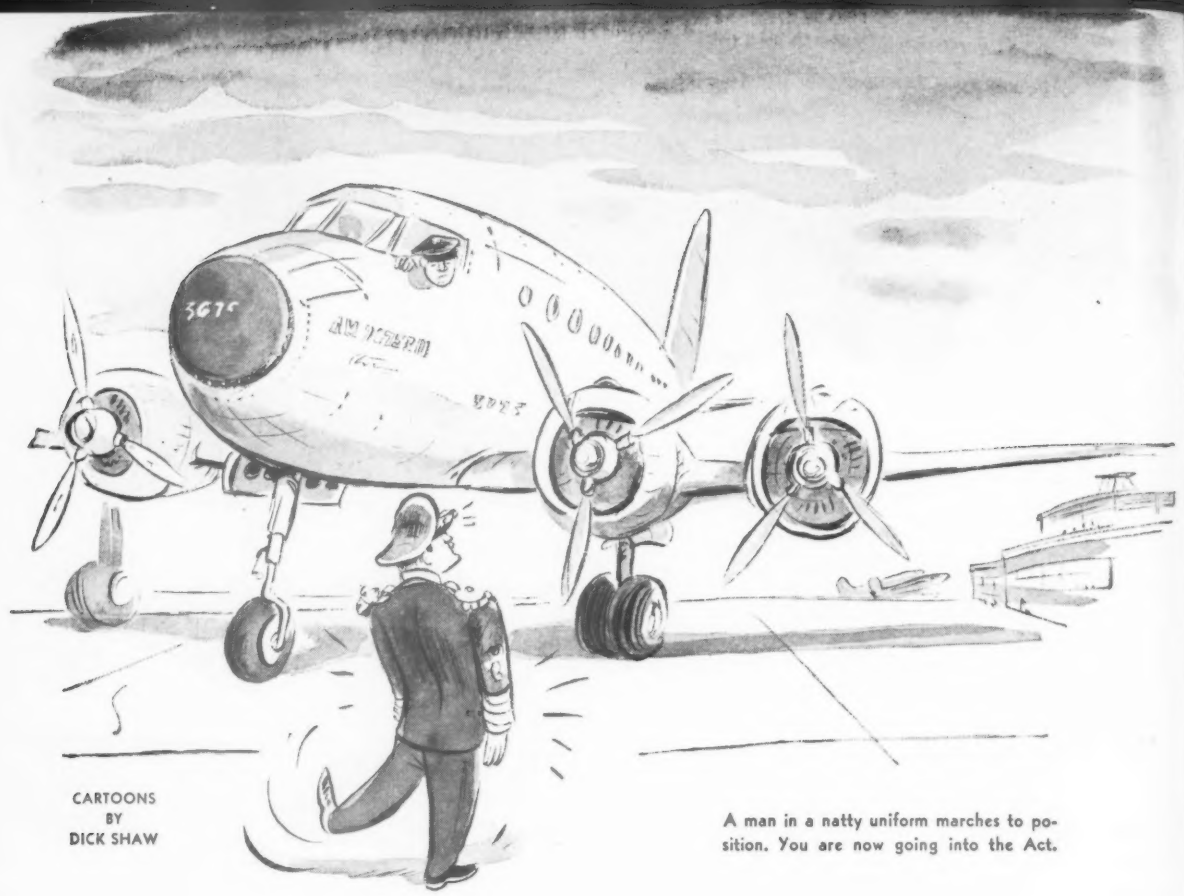
Five passengers plus pilot can be crowded safely into 245-h.p. plane. Normal crew is three persons and useful load is about 1,000 pounds.

Wire-laying containers installed under wings can be operated by cockpit control.

K-20 camera can be mounted behind co-pilot seat for photographic reconnaissance.

Rotating axles facilitate towing on narrow roads. Tread can be cut to 62 inches.

XUM



CARTOONS BY DICK SHAW

A man in a natty uniform marches to position. You are now going into the Act.

Memoirs Before Take-Off

You're a DC-6 captain. Now get ready for your take-off.

By HY SHERIDAN

LET'S make believe. You are now a DC-6 pilot. You are lucky, you are pessimistic, and you are durable like me.

For you are no longer young. By the time you have attained the DC-6 you have accumulated a wife, some kids, and gray hair, let us hope in that order. Cheerful diplomats in your town are always opening their eyes in surprise and saying to you, "Are you still flying?"

So you are an old-timer, a DC-6 captain. Reluctantly you turn off the radio and lay down your copy of Gibbon's Decline and Fall of the Roman Empire, or of Models at Play, as the case may be. You go to the window and note with satisfaction that the weather is bad, for you know that if it is bad here the chances are that it will be good where you are going, for bad weather hardly ever extends more than 700 or 800 miles.

Ready to leave, you look around for your family. Once upon a time your leaving to go out and bore your way through the hazards of the darkling skies to joust with winds and ice and thunderstorms was a family event of emotional importance. Your babies clung moistly to your neck and your breathless wife kissed you goodbye while not looking over your shoulder at something in the kitchen. But no more.

Your children are out playing. Your wife should be around somewhere, though. She is. She calls from the back bedroom, "You still here?"

You pick up your bags and go out to your car. In one bag you have a civilian suit, a clean shirt in case of officials, clean shorts in case of fire, a change of sox in case of co-pilots, toilet articles and the like. That's the light bag. In the heavy bag you have copies of the regulations and procedures that will govern every slightest detail of what you are to do, that is, if the situation is routine. In the case of difficulties the regulations solve the problem by one neat English sentence: "In case of emergency, the pilot will use his own judgment."

You look at your watch again, for you must be at the flight office one hour before the scheduled departure time of the

trip to which you have been assigned. You stagger out with your bags to your car. But here—here is a neighborhood moppet, who looks up with his eyes shining worshipfully and says, "Gee, captain, are you going to fly your DC-6? Can I help you with one of your bags, captain?" How you love children!

After patting the moppet on the head you drive out to the airport, and you drive in relative comfort. The other drivers show you some courtesy, for your uniform cap is easily confused with that of a policeman. When you arrive at the port, you drop your bags in what is known as the crew room, a place where pilots and stewardesses wait, and wait, for there is as much waiting in the airline business as there is in a maternity ward.

The stewardesses sit around and knit sox, paint their finger nails, and show their legs. The pilots kid the stewardesses, and the posters on the walls kid everybody. Bags are piled everywhere underfoot because whatever an airline may have, it is not space. Nor order. There are old paper cups with dregs of rancid coffee, cigarette butts gory with rubbed-off female health, ashes on the floor, and a litter of papers everywhere. It must have been in a crew room (or a waiting room) that the sow turned to her off-spring and advised, "Now don't make a man out of yourself."

You manage to clamber out of the crew room, and you go into the flight office. You sign the check-in sheet, putting down the time of your arrival.

Teletypes are clattering, bringing in weather reports from the stations on the various routes, telephones are jabbering excitedly. Two dispatchers are doing all of the work—not near enough dispatchers. The other 14 dispatchers are making out reports about why the work did not get done yesterday, and you know that the same thing will have to happen tomorrow. Several meteorologists are bent over weather maps, drawing pretty lines and mystic symbols which, when done, can be interpreted by the illuminati to show why yesterday's forecast was so badly off.

Wearing learned expressions you and your co-pilot study the weather maps. You are pretty serious about this. The weather has no sense of humor whatever; you are in dead earnest, for when it comes to the hanky-panky of Dame

When you're overloaded, the ramp agent always picks a little fellow to kick off.

Wearing learned expressions, the pilots study the weather maps.

Nature you have learned that you can be one or the other.

Notwithstanding your attention to the orthodox methods of analysis you know that the best weather information you get is by consulting your experience. Weather has habits by locality and by season and the rules for these are not written.

You are going to fly to New York and you note that although New York is clear now, an on-shore wind will develop and at this season of the year a wind like that will mean the making of a low overcast which will likely be there by the time of your arrival, and with the ground cold the way it is there will be mist or fog in the lower levels to hinder your visibility no little. There will be a stack-up for sure.

Your co-pilot is in the process of making out a sheet of paper called a flight plan. The route is cut up into little legs, and zigs, and zags, and he uses a rapid calculator and in half an hour has the paper filled with a lot of figures that are as good as any man's guess. Since Airways Traffic Control will tell you how high to fly (so that you will have different winds than you expected) and to slow down here and cross there at such and such a time, the flight plan is just so much parsley. The real flight plan is in your head and in that of your co-pilot.

When you sign the clearance you may note that you are signing a certificate that you are physically fit to make the flight. Nothing is said about mental fitness, the implication being that if you were mentally fit you would be doing something else. The clearance clerk takes a copy of the official forecast and staples it to the clearance.

Now, according to ancient custom, you and your co-pilot make some witty and cynical remarks, which will be taken by the office men as a signal that you are about to go to your aircraft. Thereupon you do. You and your co-pilot pick up your bags from the crew room and lug them to your DC-6.

You and he enter your cabin *(Continued on page 58)*

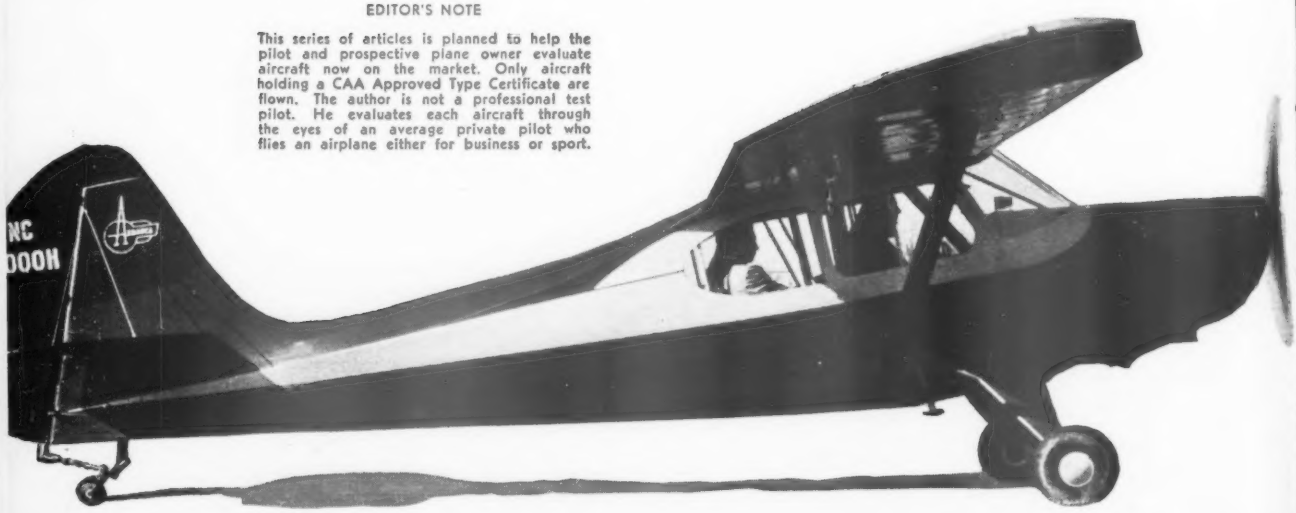
Aeronca Sedan is new four-place plane powere ' by 145-h.p. Continental engine. It has all-metal wings, conventional fabric-covered fuselage.

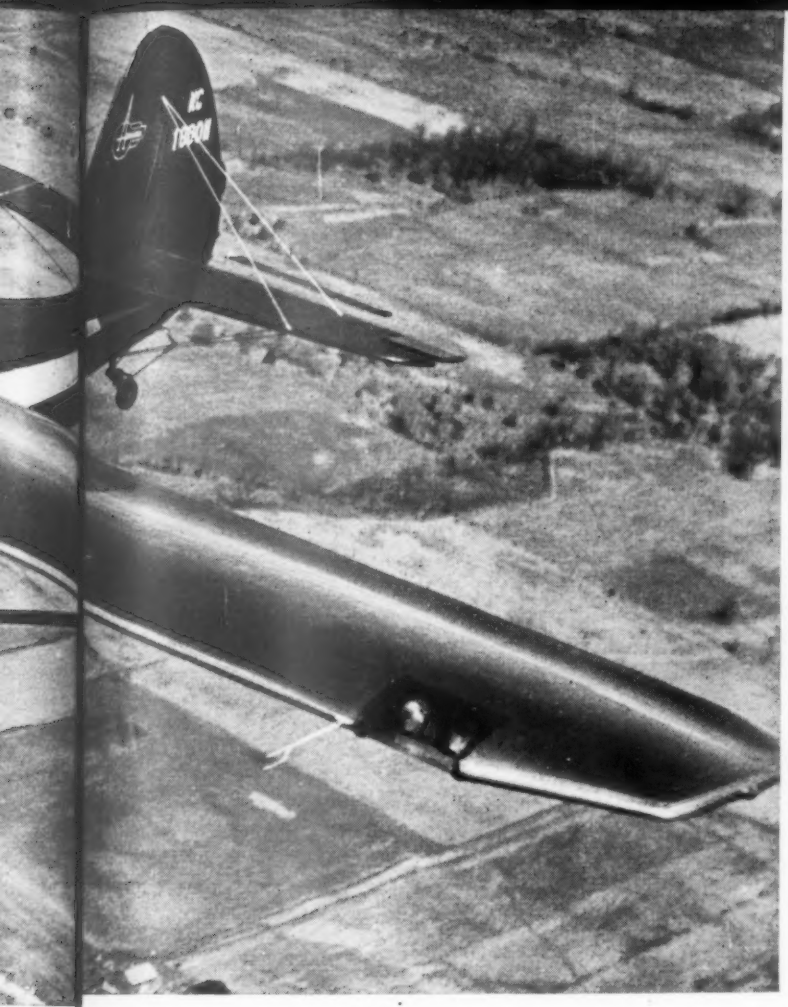
FLYING's CHECK PILOT

EDITOR'S NOTE

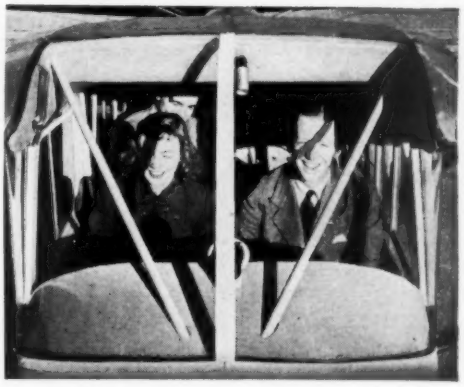
This series of articles is planned to help the pilot and prospective plane owner evaluate aircraft now on the market. Only aircraft holding a CAA Approved Type Certificate are flown. The author is not a professional test pilot. He evaluates each aircraft through the eyes of an average private pilot who flies an airplane either for business or sport.

Single strut braces the Sedan's high wing. Entrance into cabin is from in front of the strut. The Sedan has a steerable, full-swiveling tail wheel.





Interior of Sedan has comfortable, wide seats. Plane uses same door as the Aeronca Champion.



Good visibility features the Sedan, though it is impaired somewhat by the two diagonal struts.

Aeronca Sedan

By MAX KARANT

Assistant general manager and editorial director, Aircraft Owners and Pilots Association

HERE IS ANOTHER new four-placer aimed at the lower-price brackets. For $4,795 (at the factory) you get a four-place airplane with a 145-h.p. engine, fair performance for the horsepower, battery, navigation and landing lights, and an all-metal wing.

The Aeronca *Sedan* is a price-tag product. There's nothing fancy about it. Aeronca planned it that way to meet the demand for a low-priced four-placer.

Everything is kept at as bare a minimum as is possible. The fuel gauges for each of the two wing tanks are nothing more than small plastic transparent tubes running into the cockpit at the forward edge of the wing roots, above and to one side of the two front seats. The aileron control cables are out in the open, beside the back seat. The baggage compartment is just a wide spot in the fuselage behind the back seat, but it's designed to carry as much as 120 pounds (though the airplane won't carry anywhere near that amount of baggage with four people and full tanks). Still another economy is the double seat-belt for the back seat, a saving frowned upon by safety engineers and Crash Injury Research.

Generally speaking, the *Sedan* is comfortable, even for big people. Both front seats are ample, though the pilot's seat is the only one that can be adjusted for size. But the back seat is a bit crowded. It has ample width but the top of the fuselage slopes sharply toward the tail, making the cabin roof slant too. Result is that, while I could sit in the back seat, I had to slouch forward to keep from riding with my head against the ceiling.

Being an "economy" model, the *Sedan* has fairly simple instruments and controls. The standard flight instruments are there. There are toe brakes but on the pilot's side only. Instrument lights are standard. There is a map light under the instrument panel. There also is a glove compartment and ash trays. The *Sedan* also has a starter and 12-volt engine-driven generator.

Aeronca held down costs on the *Sedan* in one way by using as many parts from other Aeronca products as possible. The large single door on the right side of the cabin is from the *Champion*. So are the front seats and windows. The brakes, instrument panel, control wheels, glove compartment and ash trays all are from the *Chief*. The company figures it saved $110-000 on tooling by such interchange. *(Continued on page 66)*

XUM

All flight controls are synchronized in single stick suspended from above pilot. Note that his right arm is supported by a metal guide.

First version of Hoppicopter was designed to be strapped to the pilot's back, like a parachute. This model used a smaller engine, but had the single stick control and counter-rotating blades of the later models.

Hoppicopter

IT LOOKS LIKE a flying tricycle but it is really a new helicopter developed by Horace T. Pentecost of Seattle. Inventor Pentecost claims it will fly at 12,000 feet, has a sea level rate of climb of 900 feet per minute, can cruise at 60 m.p.h. and has a top speed of 96 m.p.h. More than that, he expects to sell it for $1,000.

In short test hops—mostly under the 30-foot ceiling presently required by CAA rules—the skeleton-like 175-pound 'copter has lifted 250 pounds—probably the first powered aircraft 30 per cent lighter than its payload. Practical useful load is 190 pounds, however.

The *Hoppicopter* has coaxial rotors, driven by a two-cylinder 35-h.p. engine also manufactured by the Pentecost company. Each of the four pliant spruce rotors, mounted on two-foot extensions, is six feet long. Total disk diameter thus is 16 feet. The frame is of light tubular aircraft steel.

Flying the *Hoppicopter* is easy, Pentecost says. The engine controls are beside the seat, and all the pitch controls have been combined in the single stick suspended from the overhead assembly before the pilot. The machine will move in any direction the stick is moved. Stick up, you climb; stick down, descend; stick forward, you move forward, and so on. Stick movement changes the pitch of the four blades at the same time and in the same amount. No tail rotor is necessary to counteract torque *(Continued on page 67)*

Hoppicopter in flight shows extremely simple arrangement of the tiny craft.

THE *Europa Rundflugs*

By R. G. NAUGLE

NEXT month's international *Tour de France* competition for lightplanes at Orly is a graphic reminder of the indestructibility of continental sport flying and the resiliency of the French personal plane industry. A 20-year cycle has thus come about since the last *Orly Meeting* held in 1928.

These informal contests or "meetings" between amateur pilots developed into one of the most famous of all international events—the *Europa Rundflug*. There were thousands of dollars in prizes and an ornate silver *Challange* Cup awarded to the aero club represented by the winning pilot. The two-week *Rundflug* included a technical inspection, performance events, a 6,000-mile tour of the principal cities of Europe and North Africa, and a closed-course race. The winner was declared on a basis of accumulated merit points.

The last *Rundflug* was held 14 years ago, but the European planes developed to meet its rigid requirements performed better in many categories than any planes being built today. Landing speeds for four-place planes under 35 m.p.h., for example, and take-offs and landings under 250 feet were typical of the better *Rundflug* performances. Although the European requirements are not entirely acceptable in the United States, the success of the contests suggests the gains which might be achieved by similar competitions in this country.

As many as 90 contestants representing half a dozen countries competed in the *Rundflugs* with planes especially designed and built by such firms as De Havilland, Caudron, Messerschmitt, Heinkel and the various national aircraft factories of central Europe. By 1934, the contest had attained such international importance that governments were giving direct subsidies to manufacturers and money was raised by popular subscription to build and enter their new airplanes.

The original Orly Meeting was held annually each fall by the *Association Francaise Aerienne* at the Orly dirigible aerodrome near Paris and run under the rules of the Aero Club of France. In turn, it conformed to the regulations of the *Federation Aeronautique International* (FAI), which has long been the official governing body for racing and world records. It quickly attracted amateur pilots from all over Europe. By 1928 it had completely outgrown its informal

Flight competitions of early 1930s set performance marks that most modern light plane owners would like to equal.

Czech Aero-200 had top speed of 147 m.p.h., low of 34.5, took off over 26-foot barrier in 240 feet.

Heinkel 64 won third and fourth places in 1932 Rundflug with 152 m.p.h. top speed, 38.5 m.p.h. minimum. Power was 155-h.p. Argus.

Winner in 1934 was the RWD-9, a Polish plane powered with 300-h.p. Skoda engine. Plane's minimum speed was only 33.5 m.p.h.

Winners, 1934 Europa Rundflug

Event	Performance	Winner
Technical Test	most points	Me-108 (250 h.p.)
Wing-Folding	44 seconds	RWD-9 (300 h.p.)
Minimum Flying Speed	33.5 m.p.h.	RWD-9 (300 h.p.)
Take-off Over 26-foot Obstacle	240 feet	Aero-200 (220 h.p.)
Landing	240 feet	Fieseler-97 (250 h.p.)
Fuel Consumption (over 385-mile course)	5 gal./hr. at 124 m.p.h.	Me-108 (250 h.p.)
Top Speed (over 185-mile course)	181 m.p.h.	Me-108 (250 h.p.)

background and was reorganized and sponsored jointly by the National Aero Clubs of France, Italy, Switzerland, Romania, Germany, and Czechoslovakia. It was then formally recognized by the FAI and became known officially, if briefly, as the *Challange de Tourisme International.*

In the reorganization, the Aero Club of France was charged with the responsibility of organizing the first contest for 1929 and, as a matter of parenthood, donated the *Challange* Cup. Thereafter, the task of organizing the contest and its location went to the aero club winning the previous year.

Pilots entered individually in the Orly Meet, but when it became the *Challange,* pilots had to be either a member of one of the competing aero clubs or join one in order to compete. Consequently, many entries were of other nationalities than that of the club they represented. For example, England's Royal Aero Club participated in only one contest, in 1930, but English planes and pilots appeared in all contests either through the French or Polish Clubs. Anyone could enter provided he was 18 years old or over, held a pilot's license in his own country, and obtained a "sports" license from the FAI—similar to the procedure for entering the National Air Races at Cleveland. All planes had to be fully insured for both public liability and property damage and have a certificate of airworthiness issued by the licensing agency of their own country.

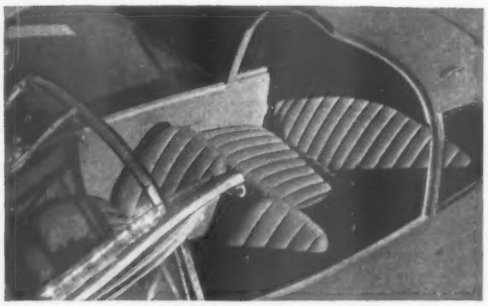
To finance the contest, each club paid an entrance fee according to the number of votes allotted them by the FAI. This totalled about $1,000 or so, to help defray expenses and set up a part of the prize money. The huge throngs of spectators at the flying events provided the rest. Cash prizes were awarded—100,000 francs for first place, 50,000 for second, 25,000 for third, and 17 prizes of 7,350 francs each. First prize was worth about $4,000 in those days. There were many special prizes, however, given by aircraft parts manufacturers, gasoline companies, and by civic authorities of the various towns through which the tour passed. In fact, these prizes often amounted to more than the official awards.

The first *Challange* under the new setup was held at Orly in the fall of 1929 and was won by Germany with a Messerschmitt-23b. So in 1930 the contest moved to the Staaken airport near Berlin. Germany won again in 1930 with a Messerschmitt-23c—and with this three-straight success (a German Klemm won the last Orly Meet in 1928), the competition became generally known by its *(Continued on page 50)*

Four-passenger ME-108 placed high in Rundflugs

Me-108 was cleaner than most Rundflug planes. Its 250-h.p. Hirth air-cooled engine gave it 180 m.p.h. top speed, yet it could fly as slow as 38.7 m.p.h.

Interior of Me-108 shows luxurious fittings, dual controls, instrument panel, that helped win technical inspection tests.



Messerschmitt had no doors. Large split canopy folded back at sides. In flight it locked shut.

This time-tested short cut will get you back on course.

Track Error Navigation

By
TOM GRIMES

A PILOT is 30 miles from base and the wind has blown him four miles to the right of his intended true course. With 50 miles between him and his destination, how much alteration of course must he make in order to fly directly to his destination?

After a few seconds rapid mental calculation, the pilot alters course to the left by 13° and heads straight to his destination. What was the "rapid mental calculation" that told him to alter course by 13°?

This type of navigation problem confronts pilots every day. When a navigator is present, the pilot has no worries; the navigator simply finds the wind effect that blew the aircraft off its course and gives the pilot a corrected heading. On a solo cross-country flight, however, the problem is different. With neither time nor materials for plotting, the pilot must make a quick and simple mental calculation that will get the job done with a reasonable degree of accuracy. Such is the essence of the 5° track-error method of pilot navigation as practiced by the Royal Air Force and the U. S. Air Force. By quick reference to his map, the pilot can estimate his error in navigation. And what is more important, he can tell what to do about it.

Since it is imperative to save time and effort in the air, the pilot should prepare his maps on the ground before taking off. This consists of drawing in lines at 5° intervals on either side of the true course from base, turning points and destination.

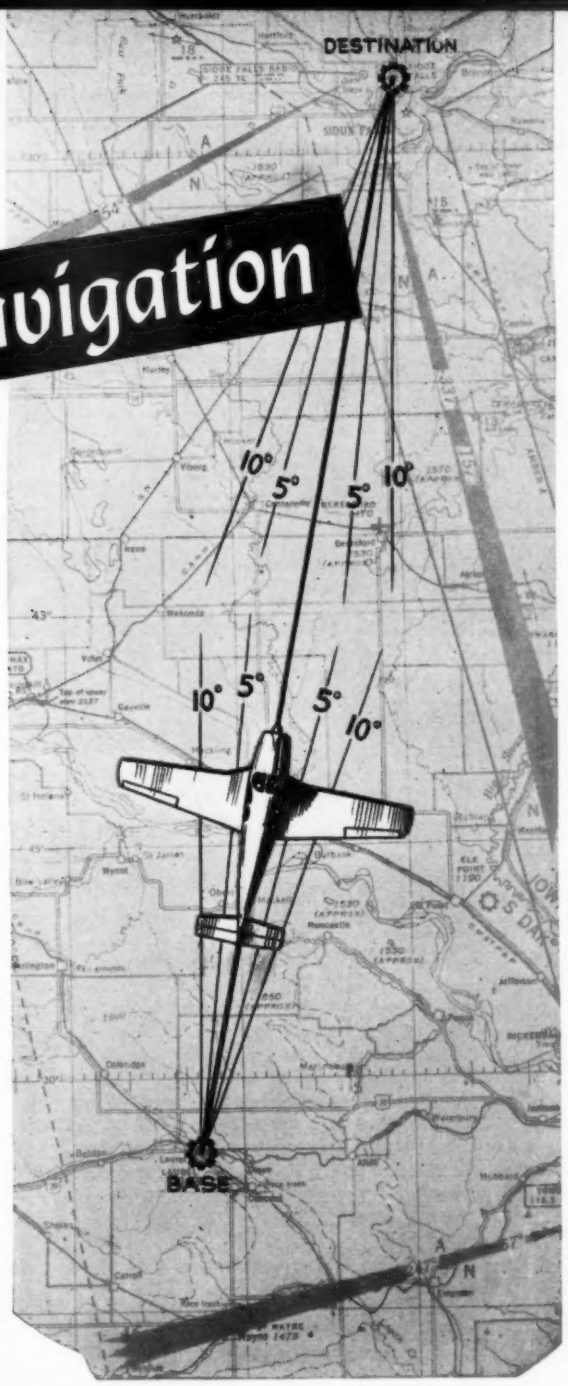
Two, or possibly three lines at 5° intervals should be sufficient for normal off-course problems. These lines help the pilot estimate the amount of his "track error," or how many degrees he is off course. Suppose, for example, the pilot finds himself over Centerville after 20 minutes of flying. By reference to his 5° lines he can see that his track error is about 7° to starboard. The next question is: how much alteration of course shall he make?

Here the problem offers two possible solutions.

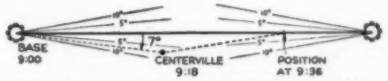
1. The pilot can alter course to regain his original true course and continue on to his destination. In this way he can utilize any good check points he had previously chosen along the original required track.

2. The pilot can make one alteration of course to carry him straight to his destination. This is advisable when the off-course fix shows the airplane is more than half way from the base at which the flight began.

Let's examine the first solution—regaining the original true course and continuing to destination. Suppose the original magnetic heading from base was 95°. Since the pilot is about 7° to the right of his true course, suppose he alters course by 7° to the left, or a magnetic heading of 88°. Obviously this will not be sufficient as he will only parallel his original true course. Suppose he *doubles* his track error and alters course to the left by 14°, or a magnetic heading of 81°. This will take him back to his original true course.

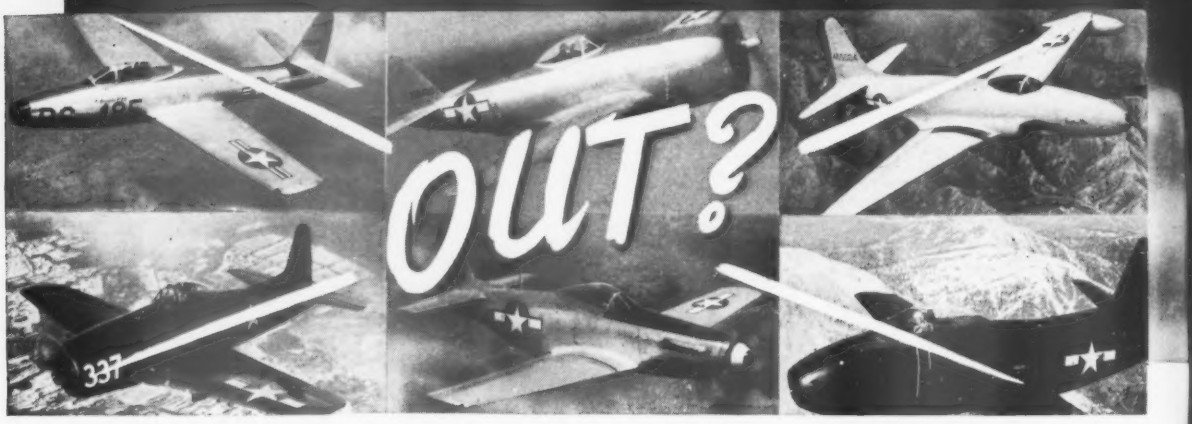


Map for flight should contain lines drawn at 5° intervals on both sides of true course from base and destination.



The next problem is, when will he get back on the true course? Obviously, in the same amount of time it took him to get off course. If he left base at 9 a.m. and fixed his position over Centerville 18 minutes *(Continued on page 71)*

Are Single-Seat Fighters OUT?



There's too much for one man to handle in a 600 m.p.h. plane. Tomorrow's fighters may all have two-man crews.

By MALCOLM CAGLE

Lieutenant Commander, U. S. Navy

THE PRESENT DAY single-seat military pilot is about as occupied as a bitch dog with a hungry 12-pup litter. Aeronautical designers and engineers are ready to admit that he is becoming "a jack of all trades, a master of none." Not only is he expected to be an expert pursuit or fighter pilot, which requires the manifold abilities of navigator, bombardier, gunner, engineer, tactician and communicator, but he is now expected to become proficient in additional duties—photography, night and foul weather flight, radar intercept, jamming and relay, smoke laying and ASW. With the iron curtain of sound penetrated, however, the single seat aircraft appears slated for extinction, much to the relief of its overburdened pilot.

The trend had its genesis even before the advent of supersonic speeds. Take a look at the hybrid F-82 for example—two F-51's married together. Or the older F-61 *(Black Widow)*. The range of conventional fighter-type aircraft has never been sufficient to permit accompanying a long range bomber on a complete round trip. The F-82 was partly an effort to overcome this deficiency. The British have long been considering doing away with single seaters as an extravagance they could not afford. The Navy's Grumman F7F *(Tigercat)*, now active in the fleet, has a two-seat configuration.

Stepping from the present toward the future, examine the experimental Curtiss XF-87, one of the Air Force's newest planes. Not much information has been released about it but this plane probably foreshadows the shape of things to come. Its two occupants sit side by side.

Why is the front-line single seater on the skids? For illustration, let's assume you are piloting an Air Force F-84 or a Navy F9F *(Panther)*—both in the 600 m.p.h. bracket—and let's assume you're up at 35,000 feet with the task of intercepting a 500 m.p.h. enemy bomber. As you know, at 30,000 feet, the sky appears purple; at 40,000 feet, with the sun low in the sky, you can begin to see first magnitude stars overhead. Visibility, in other words, becomes poor. Your oxygen mask and your bulky clothing, added to your speed, make it difficult to see.

The fighter director officer vectors you to an intercepting course. (The worst possible position, obviously, is a head-on situation where your rate of closure on the bomber is about 1,100 m.p.h.—18 miles every minute.) If the FDO doesn't do a speedy and precise job of making a merged plot, it's a cinch you'll have a tough time finding the bomber on your own. If you *should* see him, unless you're on an almost overtaking course, by the time you get turned around he will probably be out of sight. And remember, at 35,000 feet and 600 m.p.h., your diameter of turn is close to six miles.

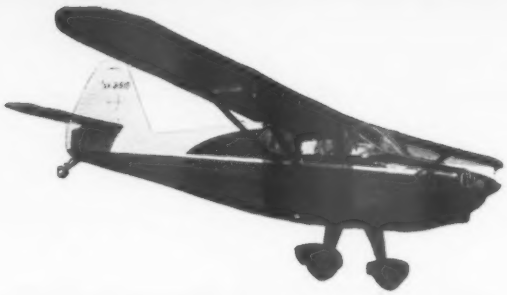
But let's also assume you *do* make an interception; that you can see the bomber. How are you going to attack him? It becomes immediately apparent that the Air Force's "pursuit curves" and the Navy's "overhead" and "high side" gunnery runs are useless. Your plane could not stand the strain; neither could your body. And even if they could you probably wouldn't get to make more than one run. Employing present tactics with present equipment, your only chance to attack him would be from an overtaking course; and if the bomber has guns in the tail, or guns that will fire aft, you are as vulnerable as he. This reverses the traditional advantage which the interceptor pilot has always enjoyed.

Mind you now, we have been talking about a 600 m.p.h. fighter plane and a 500 m.p.h. bomber. Double these speeds and you immeasurably complicate the problem.

The tactical dilemma is obvious. Even in daytime the interceptor of the future will require long range, accurate radar to find its quarry. And when it gets ready to shoot, it will need rapid-fire, heavy armament, and a fire control system to enable it to shoot from any angle without the necessity of making violent turns and maneuvers to "aim the plane." Perhaps the armament *(Continued on page 74)*

Today's two-man fighters give greater efficiency for long-range operation. From top, Northrop F-61, Curtiss XF-87 and North American F-82. **The F-61,** a wartime night fighter, was forerunner of later models such as the Twin Mustang (two F-51s joined together) and the jet XF-87.

XUM



Mt. Rushmore, often called the Shrine of Democracy, is located southwest of Rapid City, which has three excellent airports. Right, Rapid City's Dinosaur Park contains reproductions of prehistoric creatures.

"The Needles" in the Black Hills were created by thousands of years of soil and wind erosion. Flyers can take sightseeing buses to this spot.

Badlands National Monument, about 50 miles east of Rapid City, is a spectacular aerial side trip. Flyers can land at Wall, S. D., airport.

A FLYING Holiday

Black Hills OF South Dakota

Aerial tourists can land at 10 ports in these scenic mountains.

DOWN IN THE BLACK HILLS the natives don't brag about having the tallest buildings, or the biggest cities or the largest manufacturing plants.

But, if you'll drag up a chair they'll tell you tales of Wild Bill Hickok, the famous Dakota gunman. Or they'll take a moment to show you where Preacher Smith was killed by Indians in 1876. Or maybe they'll give you a lecture on the prowess of Poker Alice, the female cardshark of early Deadwood days.

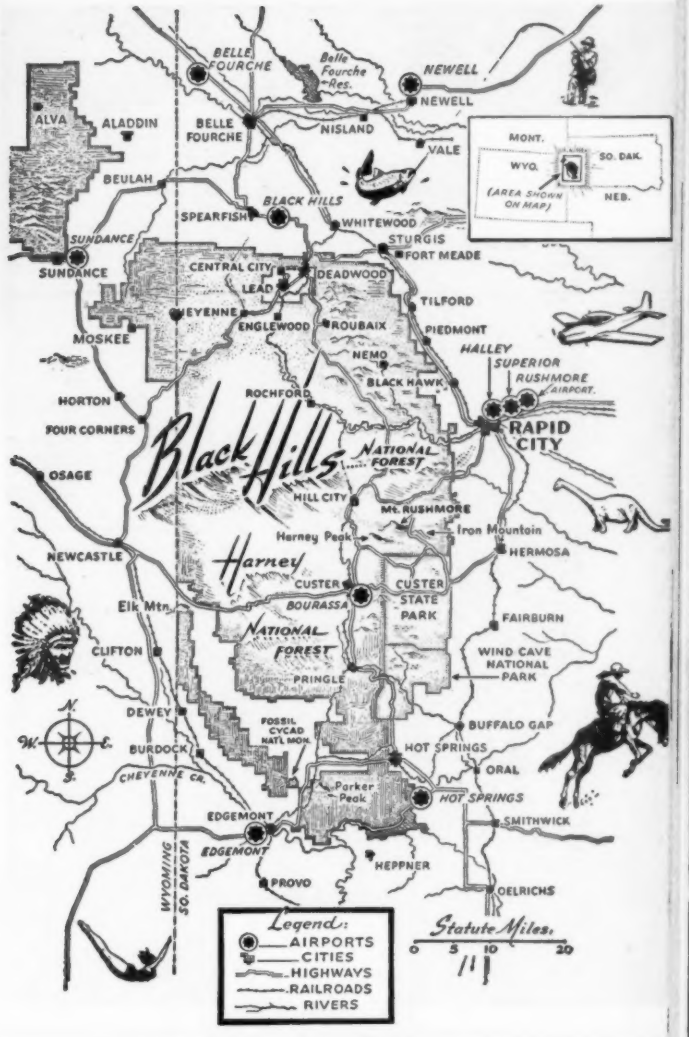
It's a good place to fly, an almost unspoiled vacationland where good trout streams, high mountains, and cool nights offer a welcome change for the city-bred pilot, sweltering in midsummer heat. The approximately 10 airports in the area can serve as excellent bases for jaunts into scenic areas which are only today receiving the tourist attention they deserve.

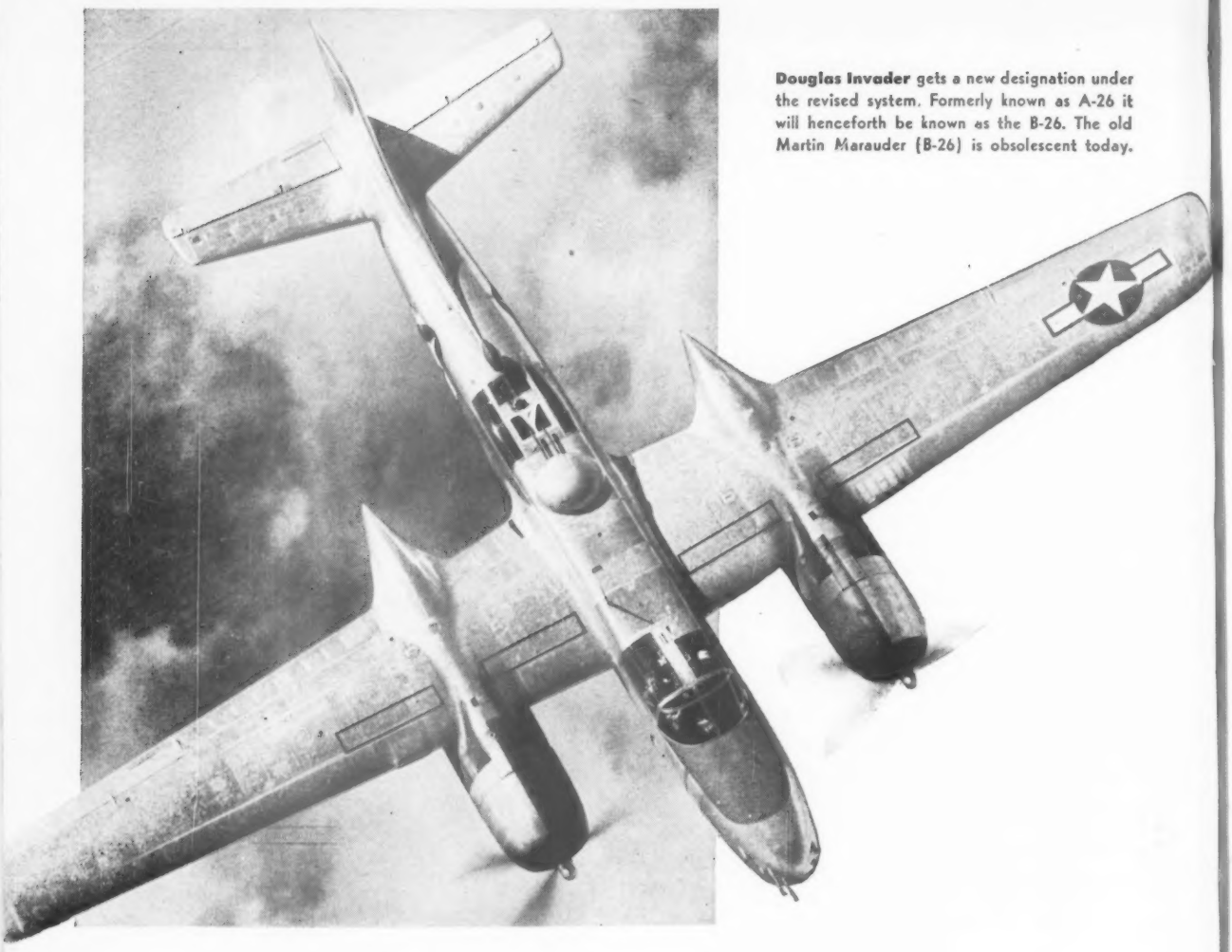
Everywhere in the Hills, however, you'll hear stories of the old west. The natives won't let you forget that it was in the Dakotas that Calamity Jane had her flamboyant career, where General Custer led an exploring party.

Most of the Black Hills are in two large national forests, the Black Hills Forest and the Harney Forest. Throughout the Hills are tourist accommodations, including hotels, dude ranches and tourist courts, many of which can be reached easily from nearby airports.

In addition to the usual fare of hunting, fishing, hiking, swimming and horseback riding, found in any vacation region, the Black Hills communities conduct annual celebrations, some of which will be held within the next several months. Among them are:

July 24-25—the Black Hills Airfair at Spearfish, S. D.
July 26-27—Gold Discovery Days at Custer, S. D.
Aug. 1—Sheridan Lake Boat Races
Aug. 6-8—Days of '76 at Deadwood, S. D.
Aug. 13-15—Black Hills Motorcycle Races at Sturgis, S. D.
Aug. 21-22—Heart o' the Hills Celebration at Hill City, S. D.
Aug. 27-28—Lawrence County Fair at Spearfish, S. D.
Sept. 4-6—Key City Rodeo at Sturgis
Sept. 6—Labor Day Celebration at Lead, S. D.
The Black Hills Airfair, scheduled *(Continued on page 72)*





Douglas Invader gets a new designation under the revised system. Formerly known as A-26 it will henceforth be known as the B-26. The old Martin Marauder (B-26) is obsolescent today.

The AF's New Designation System

NEW SYSTEM FOR DESIGNATING AIR FORCE PLANES

Fundamental Types (Denoting basic use of the airplane)		Prefix Symbols (Denoting modifications for current use)	
Amphibian	A	Bombardment	B
Bombardment	B	Cargo	C
Cargo	C	Director Aircraft	D
Fighter	F	Fighter	F
Glider	G	Glider	G
Helicopter	H	Liaison	L
Liaison	L	Missile Aircraft	M
Targets and Drones	Q	Target or Drone	Q
Reconnaissance	R	Reconnaissance	R
Search and Rescue	S	Sea Search	S
Trainers	T	Training	T
Special Research or Experimental	X	Staff Administrative Transports	V

No more than one prefix symbol is to be assigned to an aircraft at one time.
Missiles have a separate fundamental designation system.
General classification symbols are X—experimental; Y—service test; and Z—obsolete.

By

CHARLES O. PROBST
Major, Air Force Reserve

The Air Force has reshuffled its alphabet. Here's the late word on airplane designations.

AIRCRAFT OF INTERIM AIR FORCE

Name	Designations	Feature of Series
BOMBARDMENT		
Invader (formerly A-26)	B-26B-1 thru -65-DL	Attack version
	B-26B-5 thru -25-DT	Attack version
	B-26C-15 thru -60-DT	Bombardier version
Superfort	B-29-5 thru -55-BA	
	B-29-25 thru -90-BW	
	B-29-1 thru -50-MO	
	B-29A-5 thru -50-BN	250 gal. less fuel
	B-29B-30 thru -55-BA	Main turrets out
Four-engine Flying Wing	YB-35-NO	
	YB-35A-NO	
Conqueror* (6-engine— 150 ton gr. wt.)	YB-36A-CF	Bubble canopy
	B-36A-CF	
	B-36B-CF	
(4 engine jet)	B-45A-NA	
	B-45C-NA	
Stratofort*	B-50A-BO	
	B-50B-BO	Eagle wing radar
Flying Fort	RB-17G- -BO, VE, or DL	Photo version
	TB-17G- -BO, VE, or DL	Trainer
	QB-17G- -BO, VE, or DL	Drone
	SB-17H- -BO, VE, or DL	"Flying Dutchman"— (airborne lifeboat)
Mitchell	TB-25J-25 thru -35-NC	Trainer
CARGO		
Expeditor	C-45- -BH	
Skytrain	C-47D- -DL	Single-speed blower
Skymaster	C-54D-1 thru -15-DC	engine change from B
	C-54E-1 thru -20-DO	fuel tank changes
	C-54G-1 thru -20-DO	troop version
Globemaster	C-74- DL	
Packet	C-82A- -FA	
Stratofreighter	YC-97-BO	R-3350 engines
	YC-97A-BO	R-4360 engines
	C-97A-BO	
	YC-97B-BO	personnel carrier
Skytrain	C-117B-DK	
(similar to Packet)	C-119B-FA	R-4360 engines
TRAINER		
Texan (formerly AT-6)	T-6D-NT	
	T-6F-NT	
Navigator (formerly AT-7)	T-7C-BH	
Kaydet (formerly PT-13)	T-13D-BW	
Kaydet (formerly PT-17)	T-17-BW	

Name	Designations	Feature of Series
FIGHTER		
Thunderbolt (formerly P-47)	F-47N-1 thru -15-RE	long range version
Mustang (formerly P-51)	F-51D-1 thru -15-NA	bubble canopy
	F-51D-5 and -20-NT	engine change
	F-51H-1 thru -10-NA	
Black Widow (formerly P-61)	F-61B-15 thru -25-NO	
	F-61C-3 thru -10-NO½	turbo supercharger
Kingcobra (formerly P-63)	QF-63A-11 and -12-BE	armored target
	QF-63G and G-1-BE	engine change
Shooting Star (formerly P-80)	F-80A-1 thru -10-LO	
	F-80B-1 on -LO	
	F-80C-1 on -LO	
Twin Mustang (formerly P-82)	F-82E-1 on -NA	engine change
	F-82F-1 on -NA	
	F-82G-1 on -NA	
Thunderjet (formerly P-84)	YF-84A-1-RE	
	F-84B-1 on -RE	
	F-84C-1 on -RE	
(single eng. jet)	F-86A-NA	
	F-86B-NA	
HELICOPTER		
(formerly Sikorsky R-5)	XH-5A-SI	
	XH-5D-SI	
	H-5D-SI	
	H-5E-SI	
	H-5F-SI	
(formerly Bell R-12)	YH-12-BE	
	H-12A-BE	
(formerly Bell R-13)	YH-13-BE	
	YH-13A-BE	
LIAISON		
Grasshopper	L-4J-PI	
Sentinel	L-5G-VW	
Sentinel	L-13-VU	
	L-13A-BW	
	L-13B-CO	
	YL-15-BW	
Champion*	L-16A-AE	
Navion*	L-17A-NA	
RECONNAISSANCE		
(Hughes 2 eng.— formerly F-11)	YR-11A-1-HU	
Most photo reconnaissance planes are re-designated as fundamental type:		
Former F-2	RC-45-BH	
Former F-6D	RF-51-D-NA	
Former F-9	RB-17	
Former F-13	RB-29	
Former F-14	RF-80	
Former F-15	RF-61*	
RESEARCH		
(Former XS-1)	X-1-BE	

* Probable

THE AIR FORCE has revised its alphabet, bringing order out of a welter of symbols, numbers and letters intended to identify military aircraft. The new system simplifies plane designations, but for a few months it may require a second thought to remember that such planes as the A-26 henceforth will appear with new prefix initials.

The change, however, is long overdue. In the Air Force, the "alphabet" has been devoid of logical construction. It's true, "A" stood for Attack, as in A-20; "B" for Bomber, as in B-29; and "C" for Cargo, as in C-54. But what about "P" for Fighters? And "R" for Helicopter? And "F" for Photo-Reconnaissance?

It wasn't planned confusion; it all evolved during the natural growth of the Air Force. For example, fast single-place ships were called Pursuit, from the French, translated roughly as "go and get 'em." (A similar term used in the French Air Force is *chasseur.)* So the first pursuit was designated P-1. Along came the first photo-reconnaissance ship, a Fairchild. The letter "P" was already in use, so photo (Foto) ships were designated, starting with F-1.

About the time of the first P-40s, the Air Force decided that the word "Pursuit" was not truly descriptive of the type, and the term "Fighter" came into common use. Still the fighters were designated as P-47, P-51, etc. Wags at Wright Field offered to change the signs in the Procurement Section from "Pursuit Branch" to "Phighter Branch," but the fighters continue to be numbered up to P-92, and the photo ships to F-15.

As for the R-4 helicopter, the first of the type *was* a helicopter; but the second and third, the R-2 and R-3, were *autogyros.* So they were all designated under the term "Rotary-wing."

Now, the Air Force takes stock and redesignates some of its aircraft under a new system, with changes designed to eliminate the above-mentioned confusions, and allow a broader scope for new models and tactical uses.

If you think you can tell an A-26 from a B-26, you'll be interested in the changes, for they affect many aircraft now in service.

But first a word about the basic principles of Air Force Model Designation: T-M-S, "THE MODEL SYSTEM."

TYPE: The original design purpose of an aircraft: bombardment, fighter, cargo, etc.

MODEL: Aircraft of a given type which are alike in general configuration, construction, equipment and performance.

SERIES: Aircraft of a given type and model, having for all practical purposes interchangeable parts and identical tactical usefulness.

A complete model designation also includes:

(1) Block number—a further breakdown of a series aircraft according to minor changes that occur as production proceeds. Theoretically, all aircraft of a *(Continued on page 56)*

Blueprint For a Safer Plane

Control wheels in Navion are curved to absorb shock of body.

Safety results from the smooth instrument panel and folding seat of the Piper PA-11.

Cornell study shows how to build planes safer than automobiles.

SAFER PLANES for private flyers are not only possible but necessary if there is to be a marked expansion of popular aviation.

This is the belief of Hugh De Haven, Director of Crash Injury Research, based on a five-year study of survivable airplane accidents under sponsorship of the National Research Council. This project for studying causes of crash-injuries was started during the war at Cornell Medical College and has continued as an activity of the Cornell Committee on Air Safety Research.

The Cornell unit does not study crash-injury results in cases where the aircraft disintegrates; these accidents are considered "non-survivable." It is concerned with the far greater number of severe accidents in which the cabin or cockpit holds its general shape and the causes of death—or survival—are specific.

After studying hundreds of accidents, De Haven concludes that it is engineering rather than luck that allows one person to walk away from a crash in which another is killed. Crash injuries follow definite patterns; their causes apparently can be controlled to a large extent by engineering and structural design. Identification of specific causes of injuries in airplane accidents is leading to a blueprint for a small "safe" plane—a blueprint which may have a marked effect on the future safety of flying in *all* aircraft.

This "safe" plane would cost more to build but should find a wide market among people who would like to fly but are afraid. Fear of flying, De Haven says, is fundamentally a fear of getting killed in a crash. He visualizes a two-place side-by-side model that would give equal or better mile-for-mile safety than the automobile. This ship would be "crash safe" and would include the following features:

Cabin structure would be more rugged than in conventional design.

Nose sections would be long and have the general appearance of a jet fighter; all forward sections would be especially designed to carry heavy loads during collapse and arranged to "cushion" and protect the cabin of the ship in vertical crashes due to hitting trees or wires at take-off and landing speeds.

The engine would be lower, preferably under the seat or in the belly of the ship close to the center of gravity. This would give greatly improved forward vision. The engine would be geared to a slow-speed, quiet propeller.

Wings would be attached to a strong center section similar to that used in the DC-3 and various types of low-wing military planes.

Distance between the nose of the ship and the cabin would be as great as aerodynamic design would allow.

The plane would be highly spin-resistant and designed to provide adequate stall warning.

Each occupant would be equipped with much stronger safety belts than those in common use today. Chest straps or shoulder harness would be provided, preferably in one unit with the safety belt to make a "safety vest."

Instrument panel, control wheels and all other objects within range of the head would be designed and arranged in such a way that they could not inflict fatal head injuries in case of a crash.

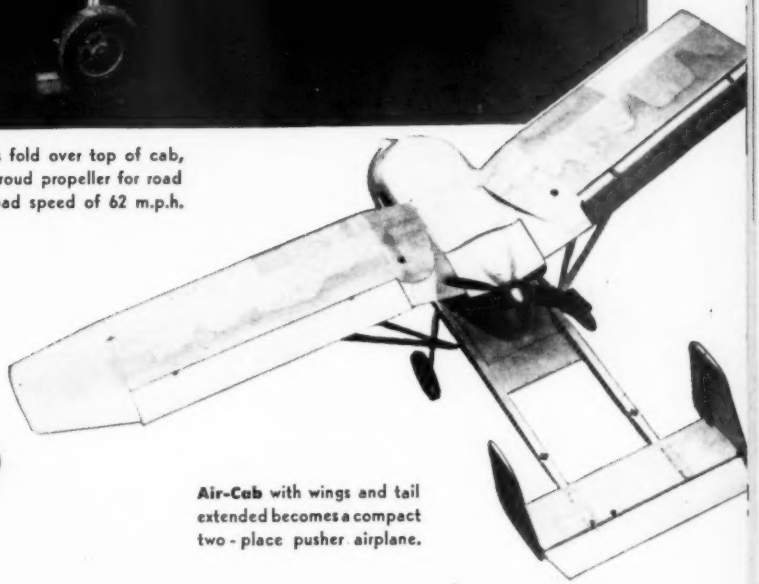
Landing gear would be constructed to carry heavy loads during collapse.

CAB figures show that fatalities in privately-owned aircraft are far greater percentagewise than those in private automobiles. De Haven points to the psychological effect on the public when another 500,000 people learn to fly and run out of gas, fly in bad weather, get lost, and misjudge landings.

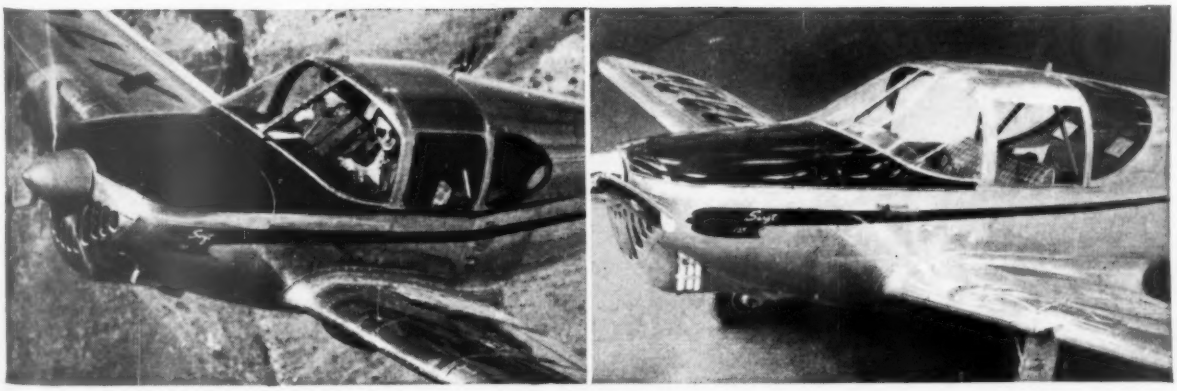
For them—and for the future of *(Continued on page 62)*

Italian Air-Cab was on display at recent Milan fair. Wings fold over top of cab, with strut pivoting on hinge, while twin boom folds up to shroud propeller for road operation. Observers claim this unique little machine has road speed of 62 m.p.h.

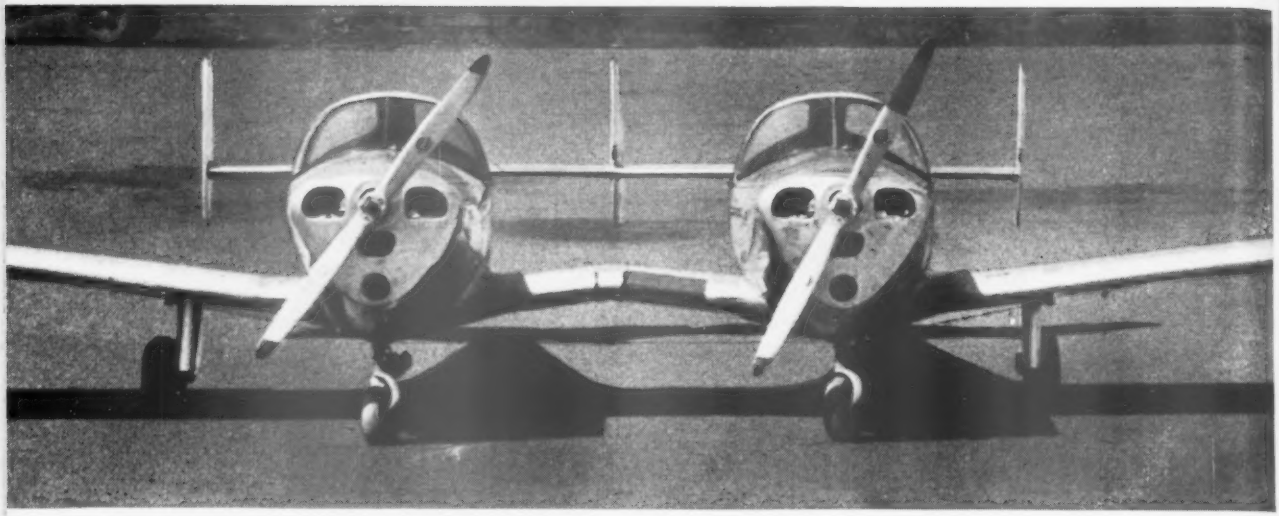
HAVE YOU SEEN?



Air-Cab with wings and tail extended becomes a compact two-place pusher airplane.



Closed cabin Temco Swift (left) went into production in June. New model has modified overturn structure, new window installations, improved cabin designing. Metal has replaced most of Plexiglas in rear of cabin and on sliding canopy. Tower vision model (right) is still offered.



"Twin Ercoupe" was built for Thresher Bros. Air Circus, Elberton, Ga., by J. B. Collie, Southeastern Air Service. It cruises at 140 m.p.h., can fly 100 m.p.h. on one engine, lands at 75. Plane has conventional controls, can be flown from either cockpit, has been rolled, looped, spun.

HAVE YOU SEEN? *continued*

DC-4M modified by Canadair, has Merlin engines.

Martin XPSM-1 is new model of flying boat featuring new type of hull expected to improve performance.

Retractable skis on Fairchild Packet were built by Air Materiel Command for snow or concrete runways.

Experimental Avro Lancaster is test bed for Metropolitan-Vickers axial flow Beryl jet engine in tail installation. Other experiments with Lancasters include use of Python and Theseus XI propjet engines, and Ghost and Nene turbo-jets installed in the outboard nacelles.

Unorthodox helicopter built by Charles Seibel, Wichita, is controlled by shifting forward section of cabin on track. Copter moves in direction of changing center of gravity. Seibel had never flown before he soloed it.

Parasite fighter is McDonnell XF-85, designed to be launched from bomb bay of the giant B-36. Tiny jet plane is only 15 feet long, has wing span of 21 feet, folding wings. It can be fueled, armed, repaired, in its mother plane "hangar."

THIS IS
Skyway One

One of two markers at Terre Haute.

St. Louis marker is 800 feet long.

Commercial signs aid navigation.

The Patecell family began their coast-to-coast flight from Washington National Airport. Skyway One, warns Patecell, is still not fully airmarked, though much work has been done.

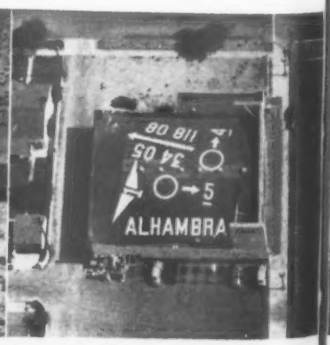
By

TED PATECELL

Pilot, American Overseas Airlines

One of West Texas' first markers.

Easy-to-read airmarker in desert.



Atop grocery store near Los Angeles.

America's "air highway" needs much improvement before flyers can depend on it. Here's what one pilot found on a test flight from coast-to-coast.

I HAVE just returned from a flight over the Wright Skyway, which has been called "the best-marked aerial highway in the United States." This story is written as a warning to pilots who believe they can cruise along Skyway One, glancing down every few minutes to see glaring white markers along their route.

You can't do it. The markers aren't there. Though many cities have installed Skyway emblems, the number is still pitifully inadequate. And many of the existing markers are located in unobtrusive spots, difficult for the cross-country pilot to see.

Since the Skyway had been publicized as primarily for family flying, I took my wife and two daughters, aged 7 and 3, over the route, simulating the problems of an amateur pilot with no radio knowledge. I planned the trip with radio off, and used only regional maps for a minimum of information. This made airmarkers of prime importance to me, and took me back to my early flying days in 1937 when I used a road map instead of air map, and had no compass. In those days, the 40-h.p. *Cubs* I was flying had no instruments, and my first cross-country turned out literally to be a "lost cause." When after two hours I located a town, I was saved from a forced landing because its name was printed on a building. Airmarkers would have saved me many unscheduled landings during those first 300 hours of cross-country.

That's why I wanted to test-fly Skyway One. I knew that the private pilot would have a tremendous gain if the route were well-defined. All he would have to do would be hold course, look for names on the ground, glance at the map to see how ground speed was doing, and correct slightly right or left as the track requires.

Here's what happened to me as I flew the Wright Skyway.

We left Fitzmaurice, our home airport on Long Island, on April 19, flying to Washington where we would "join the Skyway." The trip was a vacation, and we planned to cruise leisurely across country in our white Howard, arriving in Los Angeles on Saturday, April 24.

Washington to Springfield, O.—By noon, we were off on our first leg over the "Highway of the Sky." Since we were flying the northern sector of the Skyway to Abilene, Tex., we headed for Springfield, by way of Pittsburgh—a 400-mile hop. When the tower cleared us from its frequency, I turned off the radio and set the first heading direct for Bedford, Pa.

Markings at Bedford were distinct, and about 20 miles to the north I saw the Johnstown airport. The name, "JOHNSTOWN" stood out in large white letters on the east-west runway. Most Pennsylvania cities are clearly marked but we found less attractive conditions in Ohio. Markings were scattered, and the flyer without a radio is handicapped. Ironically, the airports don't even seem to be airmarked.

We didn't fly over a single Ohio city of less than 100,000 persons that was airmarked, until we reached Springfield. And even there, though the good burghers have gone out of their way to splash giant letters along the full length of the railway station roof, there is much to be desired. Here's why: I arrived directly over the city at 4,000 feet, at a speed of 170 m.p.h. Though visibility was good, I could find no identification anywhere and wasn't able to locate the marker until after I landed and talked to a reporter. Though I didn't spend an unusual amount of time scanning the city for the marker, I gave as good a try as the average stranger on a cross-country. Not until the next morning, after spending the night in Springfield, did I see the name—large as life—spelled out about 100 feet long. It was so dirty from train smoke that I was right over it before I detected the lettering. Skyway markers need maintenance even if it's only an occasional dousing with a hose or, preferably, a good mopping with a cleansing agent such as Soilax.

Springfield to St. Louis—En route to St. Louis, we stopped at Dayton (25 miles from Springfield), where the ramp contains a new DAYTON sign, painted in large yellow letters. But in the 335 miles between Dayton and St. Louis we saw airmarking only at Indianapolis and Terre Haute. Some distance out of Indianapolis I caught sight of the high water standpipe, typical of many midwestern cities. Coming closer, I could see standard obstruction painting of red and white squares near the top. "Indianapolis" was painted on the top, with airport directions, mileage, etc.

Terre Haute's airmarking conformed exactly to CAA specifications. Passing over the city at 6,000 feet I could easily distinguish the markings. Two were located on prominent buildings.

(Continued on page 64)

Skyway marker at Municipal Airport.

Up-to-date Southern Sector marker.

Small town sign in North Carolina.

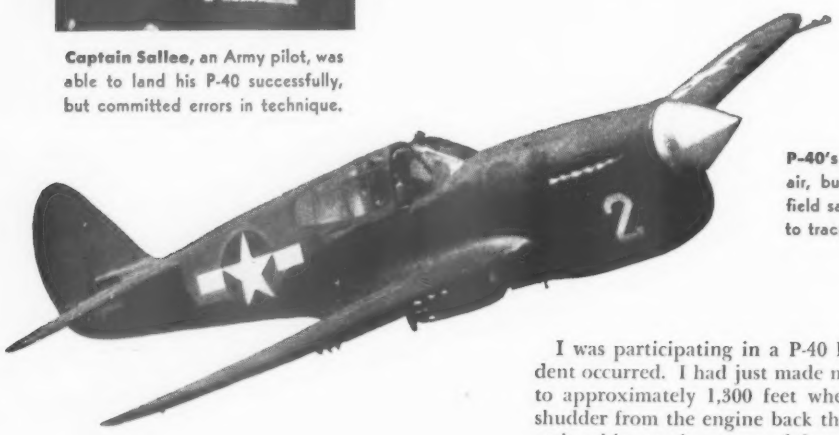
I Learned About Flying From That! NO. 105

Captain Sallee, an Army pilot, was able to land his P-40 successfully, but committed errors in technique.

By

ELLSWORTH D. SALLEE
Captain, Air Force Reserve

Only luck brought this P-40 pilot home after his engine caught fire.



P-40's engine exploded in mid-air, but author brought it into field safely, enabling mechanics to trace trouble in other planes.

THE CRASH TRUCK, ambulance, and fire truck screamed down the runway behind my P-40 as I stopped and leaped from the smoking plane. From the ramp came the squadron commander's jeep followed by the commanding officer's staff car. I gingerly wiped oil from my hot face and walked nervously toward the jeep as the squadron commander vaulted to the ground and ran toward me.

He grabbed me by the arm and slapped me heartily on the back, pulling me in the direction of the staff car. "Good job!" he exclaimed. "Really used your head, Boy!"

The commanding officer stepped from his staff car and I saluted.

"That was a commendable piece of flying, Lieutenant. You'd better get down to the station hospital for a check-up. Get something on those oil burns."

I stammered a reply and saluted again. Following my squadron commander to the jeep, I gave him information on the instrument readings at the time my plane caught on fire and began to burn within a mile of the field.

Not until I had been checked at the station hospital and had returned to the flight line to hear the congratulations of my wingmates did I realize that I deserved congratulations on my good luck instead of my good judgment. Sitting in the office of the Flying Safety Officer, filling out a report on the incident, I suddenly began to shake uncontrollably. I revisualized the fast-moving sequence of events preceding the forced landing and saw several glaring errors in flying technique, any one of which could have been fatal.

I was participating in a P-40 landing stage when the incident occurred. I had just made my third take-off and climbed to approximately 1,300 feet when a sharp explosion sent a shudder from the engine back through the fuselage. Immediately white smoke streamed from the exhaust stacks and the engine began to vibrate and lose power. At first I thought the coolant gauge had failed to register properly and the engine had overheated, causing the coolant to escape through the relief valve. Before I finished my hasty turn toward the field I realized that something else was wrong.

The white smoke was replaced by oily black smoke tipped with orange flame. By the time I rolled out of my turn, oil had covered the windshield and hot black fumes were streaming past the cockpit. I knew that I was in real trouble when the loss of power became so great that the airspeed began to fall off rapidly. My training made me automatically drop the nose enough to hold the airspeed safely above stalling. Then I flew instruments as I had never flown them before. I had to go on into the field; I had made my choice.

I knew that I had made a wrong decision. The wide, level country around the airport would have made a forced landing simple, but the first thought that entered my mind was to get into the field. After making my turn toward the wide runway I was too low to change my mind. I could have bailed out at the first sign of fire. Sitting there sweating it out, thinking that I should have bailed out or landed straight ahead in the mesquite, I made another error. I thought of it later as the wheels touched the runway.

I had fully explored the possibility of getting more power from the failing engine by using the r.p.m. control and the throttle. I found that there was a constant r.p.m. no matter what I did: I could get no more power from the engine at full throttle than at half throttle. In my experimenting I discovered that I had to cut the *(Continued on page 74)*

"I'm too old *NOT* to fly!"

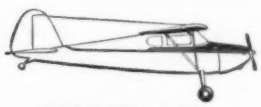
1. "**No more sleeper hops**—no more bucking traffic—for yours truly! After thirty years on the road, I've found the *easy* way to cover my territory . . . in my own Cessna 140! It's a real cross-country plane—with all-metal structure and a luxurious cabin.

2. "**Flying my Cessna is easy.** I find it relaxing . . . invigorating . . . as simple as driving a car! With Cessna's full-range flaps—I float in to short-field landings easily, safely. And Cessna's Patented Safety Landing Gear smooths out the roughest runways.

3. "**I travel farther**—make more money—*yet spend more time at home!* My Cessna's cruising speed of over 105 m. p. h. and 450-mile range get me there and back in a hurry. And if it takes ten minutes extra to close a sale—what of it—I make my own schedules!"

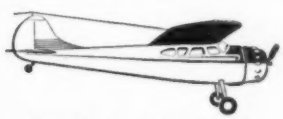
See the New 140 . . . powered by a C-90 Continental Engine which develops more horsepower at less RPMs for faster take-off and climb, substantially greater cruising speed, far quieter operation.

ONLY CESSNA OFFERS A COMPLETE LINE OF PERSONAL PLANES



CESSNA 170

The low-cost, 4-place "Family Car of the Air." Easy to fly—economical to operate—plenty of room for the whole family (4 adults) plus luggage. Never before has such room, speed, comfort and utility been offered at anywhere near the same price. All-metal structure. 145 H. P. Continental Engine—over 120 m. p. h. cruising speed—500-mile range! See it!



CESSNA 190-195

Practical 4-5 place personal or company *airliners.* All metal—airline-type engines—Hamilton Standard Constant Speed Propellers—every safety and comfort feature. Yet surprisingly economical to own and operate. You get about 12 miles per gallon of gas! The 190 has a 240 H. P. Continental Engine and cruises at well over 160 m. p. h. The 195 has a 300 H. P. Jacobs Engine and cruises at over 165 m. p. h. Both have ranges of over 700 miles.

See Your Cessna Dealer

MAIL THIS COUPON

Cessna Aircraft Co., Dept. F, Wichita, Kansas. Please send free literature giving complete description of the Cessna 170 ( ); Cessna 120, 140 ( ); Cessna 190, 195 ( ); Literature for model builders ( ).

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AOPA NEWS

Aircraft Owners and Pilots Association is a service organization for the private pilot or aircraft owner. AOPA's full time staff is devoted to helping the individual pilot. Its aim is: "To make flying more useful, less expensive, safer and more fun."

Headquarters are: 15th and New York Aves., Washington 5, D. C. Members also receive a special AOPA edition of FLYING, newsletters and confidential aviation data. Opinions expressed in this column are not necessarily those of FLYING MAGAZINE.

PERSISTENT rumors about gas rationing for private planes continue to crop up. AOPA, checking with two of the country's largest oil companies as well as officials of the Oil and Gas Division of the Department of the Interior, has learned that the rumor is unfounded. Most recent AOPA member to query national headquarters sent along a clipping from a small Minnesota aviation newspaper which says that gas rationing is coming "shortly" for private planes, and that coupons had already been printed.

"Apparently that story is just getting out to Minnesota," an Interior Department official told AOPA. "We've heard somewhat the same story regularly ever since last summer. It usually applies to automobile gas rationing, but we have heard it said that the same plans are intended for private planes.

"I can tell you this: if this rumor is true we don't know about it—and we will be the ones to lay the plans for such a move. As a matter of fact, the gasoline situation is not as bad at the moment as it was. Short of a national emergency, it will remain in its present status." A more detailed report will appear in the July confidential newsletter to AOPA members.

RENTZEL MEETS AOPA BOARD

Delos W. ("Del") Rentzel, new Civil Aeronautics Administrator, recently flew to Philadelphia with J. B. Hartranft, Jr., AOPA general manager, for an evening meeting and dinner with AOPA's board of directors. Rentzel is an AOPA member (27323), a private pilot and owns a Luscombe.

During the meeting Rentzel discussed with the Board the entire civil aviation picture, and explained his general attitude toward private flying. Particular emphasis was placed on a development program for personal aircraft, and AOPA has been requested to draw up a recommended program for CAA consideration. The meeting was Rentzel's first official contact with private flying since being named Administrator.

JET MOVIE

One of the best films on the elements of jet propulsion was made by Walt Disney for one of the jet engine manufacturing companies. It explains and illustrates the theory of jet propulsion in colored animated cartoons. AOPA has a special arrangement with the jet engine manufacturer whereby AOPA members can borrow the film for special showings.

Congressional Pilots Association members discuss route for recent breakfast hop to Rehoboth Beach, Del. Eighteen congressmen and their assistants belong to CPA. J. B. Hartranft, Jr., AOPA general manager (sports shirt), points out terrain features.

AUTOMATIC GCA

Recent announcement of details of the new automatic GCA developed by the Air Forces and Gilfillan Bros. of Los Angeles points up the basic AOPA contention that GCA is greatly superior to ILS for use by the majority of flyers. The automatic GCA announcement further spikes the airlines' contention that ILS is preferred to a great extent because it can be switched into an airliner's autopilot for automatic let-downs. The new GCA can do the same thing, with greater reliability and accuracy than ILS according to our information—or it can also be used manually, just as GCA is used at the present time.

AOPA has been familiar with the details of automatic GCA for some time but was sworn to secrecy by military officials. This is in keeping with the standard Government practice of seeking AOPA advice and assistance in all matters that affect private flyers. The auto-GCA project is related to the new air navigation facilities subcommittee of the Air Coordinating Committee of the Government. AOPA is official private flyers' representative on that subcommittee, along with representatives of other branches of aviation, including the Air Transport Association, Air Line Pilots Association, Air Forces, Navy, Coast Guard and CAA.

Purpose of the committee is to formulate plans for the best all-weather air navigational facilities. AOPA feels that the private flyer needs GCA, high-intensity lights at key airports, retention of the present low-frequency radio ranges until the new omni-range equipment is proved practical to the needs and purse of the private flyer; and retention of present rotating beacons on the nation's airways.

Private pilots, long plagued by obsolete air navigation maps (particularly sectionals) sold to them by airport operators and other sales agencies, are being alerted by AOPA to report all instances of such sales. Officials of the Coast and Geodetic Survey have asked AOPA to collect these reports.

Pilots are urged to check on the official dates of the latest maps they want to buy. Lists of these current dates, shown for each sectional map published by the Government agency, are available to AOPA members in The PILOT, issued monthly. AOPA members wishing to report such illegal sales should send the name of the selling agency, the name of the chart, and the time and place of the sale, to AOPA headquarters in Washington.

TITLE TROUBLE

Title searches still are a major source of trouble to would-be plane owners. AOPA, working toward a solution of this problem for private flyers, continues to urge careful checks on all aircraft titles. Numerous cases continue to come to AOPA headquarters involving new aircraft with clouded titles. There appears to be some improvement in connection with used-plane titles. AOPA's special title-search service still is available to members for a flat $2.50 per plane. Title-search fees for non-AOPA members range from $5 to $18.

NO. 30 IN THE SERIES FEATURING PROMINENT ESSO AIRPORT OPERATORS

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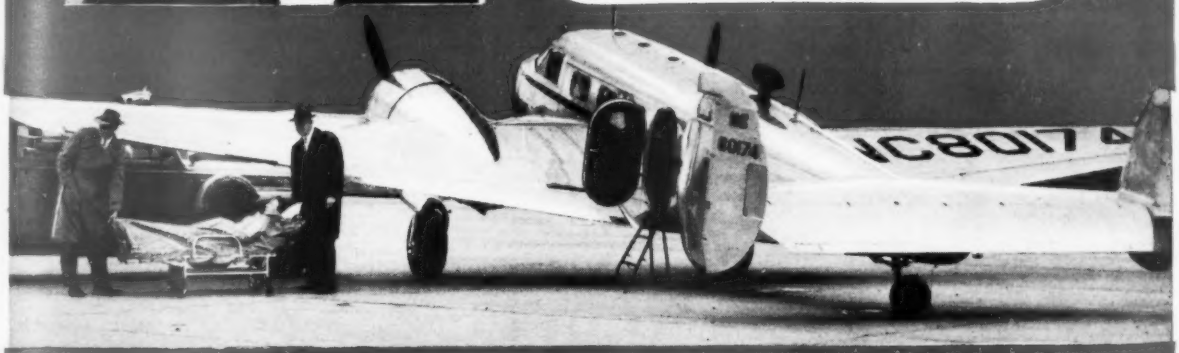

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THE LIBRARY

THE ARMY AIR FORCES IN WORLD WAR II, Volume One, Plans and Early Operations. Prepared under the editorship of Wesley Frank Craven, New York University, and James Lea Cate, University of Chicago, by the Office of Air Force History, Col. Wilfred J. Paul, USAF, Director. Published by the University of Chicago Press in 1948. 788 pages. Price $5.

Perspective is the key to understanding. The average reader of newspapers and even magazines, caught in the barrage of day to day events, cannot retain the long view. But perspective has been caught superbly in the first of a seven-volume history on The Army Air Forces in World War II.

Possibly this initial volume will be the most interesting in the series, for its first 71 pages are devoted to a review of early Air Force history up to the start of World War II. Here is the story of Gen. "Billy" Mitchell, undistorted by hero worship or partisanship, the fights between Air Corps and Navy, Air Corps and Army Ground Forces, Air Corps and Congress.

When the United States entered the First World War, the Army's air establishment consisted of 131 officers and 1,087 enlisted men. Nine factories in 1916 had produced a total of 64 airplanes. At two flying fields operated by the Army, there were 55 trainers, of which General Pershing later said, "51 were obsolete and the other four obsolescent." Congress appropriated $640,000,000 for aviation, and with great ballyhoo the U. S. set bravely forth to build "clouds of planes" for the "million roads to Berlin."

But then, as now, money could not buy time. The program was too late. It was confused. The General Staff was without experience in formulating air policies. On Armistice Day, of 2,925 planes reaching the AEF's zone of advance during the war, only 696 were of American manufacture.

Between the two wars, the Air Service was stymied by lack of planes, men, money and by the bigger rival Services. In self-protection many aviators advocated an independent Air Force. By June 30, 1922, the Air Service numbered only 952 officers and 8,936 enlisted men. This small nucleus, chronically short of funds, nevertheless maintained the integrity of the Service and had many accomplishments.

The two most memorable were the development of a doctrine of strategic air power and the bombers to implement it. General Mitchell had a strong hand in the first. The Air Force leaders in the early 1930s laid the groundwork of experimental planes that developed into the wartime *Fortress*, *Superfortress*, and *Liberator*—those great strategic weapons.

The parallels to the 20s and 30s still exist. The squabbling between the services, the arguments over air power vs. land power, air power vs. seapower, the arguments whether the air can be decisive in war—all these are still with us. Powerplants still limit the performance of bombers. Even more years are required to develop a preliminary design into a proven combat airplane than were needed before the war.

The status of the opposing air forces in World War II is outlined here, and the early warfare in Europe and Africa. Then came the attack on Pearl Harbor and the subsequent events of the Pacific War. The first volume ends on August 17, 1942, when 12 American *Flying Fortresses* took off from England on the first bombing offensive against Europe.

There is wonderful detail here on many events that have not been fully told before or were recounted only in long-winded official documents. There is a reconstruction of the Japanese attack on Pearl Harbor, for example. There is a copy of a stern warning message to the Army commanding officers in the Philippines, Hawaii, Panama and the Western Defense Command on November 27 — 10 days before Pearl Harbor — that should leave little doubt about that controversial issue. There is an inquiry as to why our bombers were caught on the ground at Clark Field in the Philippines. And there are many others. This is certainly a book that no serious student of military aviation will be without.

CURTIS FULLER

FLYING

"I still think it'd pay for us to land and take a good look for the gasoline cap."

AIRCRAFT BASIC SCIENCE by the Technical Development Staff of Northrop Aeronautical Institute. Published by McGraw-Hill Book Co., 330 W. 42nd Street, New York 18, N. Y. in 1948. 440 Pages. Price $6.

My first glance at the title of this book gave me the chills because of the formidable word "Science," but it was a pleasant shock to discover that even I was able to understand the contents.

Most licensed mechanics should have a working knowledge of many subjects bordering on the scientific, but most textbooks I've seen, until now, have contained only a few items that are really clear and understandable. As for the rest, any mechanic who could comprehend them had better be an aircraft engineer.

"Aircraft Basic Science" has a concise, simple style and covers each subject thoroughly, beginning with the theory of flight and including aircraft structural components, blueprint reading, aircraft plumbing, fundamentals of aircraft electricity, aircraft storage batteries, generators, motors, concluding with pressure, mechanical and electrical instruments. All of the important items are clearly illustrated with diagrams and photographs.

This book gives every indication of having been compiled by men thoroughly versed in their respective fields and should be in every mechanic's library.

GEORGE E. ANDERSON

TWELVE WALKED AWAY by Marguerite Gaylord Tate. Published by Harcourt, Brace and Co., 383 Madison Ave., New York 17, N. Y., in 1948. Price $2.50.

This book is a behind-the-scenes story of the 12 people (eight men, three women, one little girl) who were in the plane that crash-landed in the Swiss Alps in November, 1946. The author, mother of the pilot, was one of the passengers and she tells simply and interestingly how ordinary people behave under such extraordinary circumstances.

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WITH HY SHERIDAN

Captain, American Airlines

WHY CAN'T A DUCK DUCK? We have had another case of a bird's not paying attention. The Air Transport Association experimental DC-3 was flying along when a duck came through the windshield, putting out the co-pilot's eye, a tragic experience for a gallant young man.

You may have heard of our bird-proof windshields. Well, they are only proof against what we might call the feather-weight birds—and then only if the windshields are kept warm; they're brittle when cold.

★ ★ ★

How do you like the title to this column? Sadie the Stewardess says she wouldn't be surprised if the title to my next column is "Doing Time."

★ ★ ★

MEDICAL NOTES. When airliners get to altitude, the stewardesses swell. This is no joke, especially if you are a stewardess. This swelling up is contrary to physical laws, I am assured, but nevertheless, the girls swell.

Not only do their shoes cut into the flesh across the instep, but their clothes get tight in other places and . . . well, can't anyone do something about this emergency?

★ ★ ★

SOFT AS A FEATHER. What does it take to land a DC-6?

First of all, it is much easier to land than any of the lightplanes and this is especially true in cross winds, gusty air, and like conditions.

It takes a planner, a fellow who plans the approach and landing out ahead of time. All reactions of the ship are slow, and this is slightly bad in one sense, but very good in another. She's steady and kind of set in her ways.

The pilot has to establish an approach speed that will allow for any possible wind gradient or lull. The rest is so simple that you won't believe it.

The pilot aims for the end of the runway and sets his power to give him the speed he wants. He "aims" as you would aim a gun. Then he simply sits. Gusts won't budge a heavy plane and cross winds don't mean much to a very fast one.

When our pilot is a few feet above the runway, 30 or so, he lifts his aim, pointing his personal chin or nose at a spot 100 yards or so farther down the strip. Remember, he doesn't land where he is looking because the wheels are quite a bit below his eyes; in fact his eyes are about on the level of a second story window.

No, he doesn't jockey with the stick or wheel. In a sense he is flying her on but the angle is so slight that his downward speed is probably less than half an inch free drop. He just tip-toes on.

After this miracle he goes back through the cabin and some of the passengers say, "that was a fine landing, captain."

He modestly replies, "Oh, there's nothing to that, you know."

There isn't, either, but nobody believes him.

WHO IS SHERIDAN? FLYING *has had scores of letters wanting to know more about Hy Sheridan. He flew with Lincoln Beachey. He flew in World War I. He's been flying ever since. He's a pilot, inventor, physicist. He once flew with the Mexican Air Force. He was on Gen. Billy Mitchell's defense staff. And he's also a top-notch writer as his articles and column in* FLYING *attest! Right now he's a captain on American Airlines, flying DC-6s between Chicago and Mexico City. Some day the editor hopes to persuade him to tell you the most interesting story in his whole repertoire—the story of Hy Sheridan.*

There are rumors that a joint committee is going to be set up to do something about Airways Traffic Control. They make such committees joint committees because who wants to drink alone?

The traffic control situation is so bad that I'm unable to see what changes they can make that won't be practicable.

Meanwhile, I'll be running into you.

★ ★ ★

Air safety is like chastity. We think very highly of it and we talk about it a lot but we don't really do very much to preserve it.

The Europa Rundflugs

(Continued from page 30)

German name—the *Europa Rundflug* (Around-Europe-Flight) and has been known as the *Rundflug* ever since.

Poland won in 1932 with a RWD-6 (Rogalski, Wigura, and Drzewiecki Aircraft Company) and so the contest moved to Warsaw for 1934. To the consternation of the Nazi bigwigs who were now heavily backing German entries as a matter of national pride, Poland won again in 1934 with a RWD-9 (a redesign of the RWD-6). That was the *Rundflug's last year.* It was discontinued due to the political unrest accompanying the rise of Nazism in Germany.

Of the four *Rundflugs* then, Germany won two with Messerschmitts and Poland won two with RWDs. Since a three-times winner retained permanent possession of the *Challange* Cup, an intense rivalry developed between Germany and Poland in the last two contests. Germany, with direct government money, built a series of very modern Hienkel, Fieseler, Klemm, and Messerschmitt low-wing monoplanes in an effort to capture the Cup—and came close to doing so. In 1932, the Messerschmitt-29 (a further redesign of the Me-23) was scratched from the contest at the last minute because of longitudinal instability but was said to have flown the course later with substantially better performance than did the contest winner. A Klemm came in second and fifth, and Heinkel-64s came in third and fourth. In the 1934 contest, Germany had to be content with third place with a Fieseler and fifth and sixth with Messerschmitts.

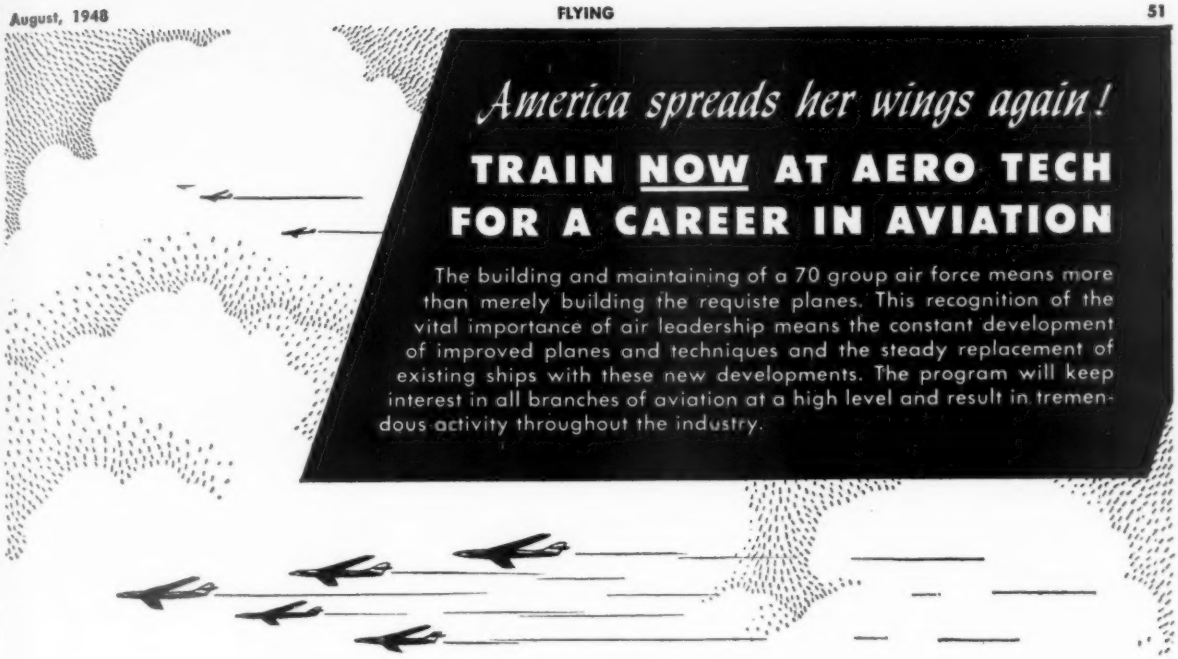
The general organization and the events remained substantially the same for the *Rundflugs* as they had been for the original Orly Meetings, although the winning aero club could and often did introduce changes in the regulations and the system of scoring. Such changes, however, had to be agreed upon by the other clubs.

The last *Rundflug*, held in 1934, however, best demonstrates the setup of the contests and how they were run. The 1934 planes were the most highly developed of the *Rundflug* series. Retractable gear were used for the first time, ground adjustable propellers were rather common, and Fowler flaps, retractable slats, and spoiler-type ailerons were used on most of the leading planes.

The allowable weight empty was increased from 1,056 to 1,235 lb. to correspond to the First Category of the FAI classification of lightplanes. Thus they compare roughly with our four-place Bellancas and Stinsons, although they all carried considerably more power—from 220 to 250 h.p. as compared with 150 to 165.

The basic means of scoring involved a system of merit points which were given for performance exceeding a certain minimum or qualifying level. There were no maximum number of points attainable but the RWD-9 of 1934 won with 1896 while the next 10 planes all had 1800 or more. The contest was extremely close and a plane had to excel in all events in order to win.

The entire *Rundflug* consisted of four



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main events. First, a "quality" ground inspection was held to check the obvious design features—the number of seats, visibility from the cabin, type of construction, equipment and accessories, size and arrangement of the baggage compartment, etc., with 500 points as the maximum possible. The wings *had to fold* in such a way that the craft could be towed through an inverted U-shaped gate 11.5 ft. high by 14.7 ft. wide, and if folded within one minute, rated 12 points. Another 12 points were given if only one wing joint were involved. Starting the engine from the cabin gave 24 points.

A performance contest was then held to determine the minimum flying-speed and the shortest distance to take off and land over a 26-ft. obstacle carrying a pilot and about 500 lb. of fuel and ballast. The minimum speed event was flown over a ½-mile course at constant altitude, carrying a pilot and one passenger as well as 440 lb. of ballast to simulate two additional passengers and baggage (since some entries had only three seats); 6 points were given for every mile per hour below 46.5. Anything above 46.5 m.p.h. disqualified the entry from the competition! Take-offs and landings of more than 820 feet were disqualifying, while 12 points were given for every 50 feet less for take-offs and 18 points for landings.

A fuel economy test was then run over a 375-mile course with a maximum allowable consumption of 11.8 gallons per 100 miles; 17 points were given for every gallon less.

The actual *Rundflug*—the 6,000-mile tour of Europe—then took place, passing through Berlin, Brussels, Paris, Madrid, Casablanca, Rome, Prague, and back to Warsaw. This was a reliability tour—and a race. Of the 880 points available (half those needed to win), 720 could be obtained simply by cruising at 131 m.p.h. or better, and 160 points could be gained by arriving punctually at the various check points along the route. The first competitor arriving late after the check-in time lost 60 of his 160 points; the second lost 100, and the third was disqualified from the competition. In a sense, then, there was a certain element of luck involved. Forced landings in themselves didn't necessarily lose points—if the pilot could make a quick fix and get to his next check point in time.

Points for cruising speed on the tour were set up in the following way. First, the minimum qualifying speed was 84 m.p.h., while anything over 131 m.p.h. didn't count. Average speeds between 87 and 118 m.p.h. counted 19.4 points per m.p.h. (with a maximum of 600 points); between 118 and 124 m.p.h. gave 13.3 points per m.p.h. (with a maximum of 80 points); and between 124 and 131 m.p.h. netted 6.6 points per m.p.h. (or 40 points), for a maximum of 720 points. (The odd figures resulting from the use of the metric system.)

Since about half of the points needed to win were gained on the tour, a contestant had to fly on schedule and keep his cruising speed above 131 m.p.h. On the other hand, there wasn't much point in cruising faster other than to protect himself timewise between check points if he had a forced landing. Most of the planes, however, cruised much faster.

The last event of the contest, after arriving back at Warsaw, was an all-out, free-for-all speed race around the triangular 185-mile fuel-consumption course. The qualifying speed was 131 m.p.h. with every additional 5 m.p.h. worth 8 points.

Of the approximately 1900 points required to win, roughly 450 were picked up from the ground technical inspection, about 60 from wing-folding and engine starting, 80 for minimum flying speed, 135 for short take-offs, and about 200 for short landings. The tour gave about 850 points and the fuel consumption and the speed race each gave about 70.

This breakdown of points gave some rather unusual results. A very large number of planes picked up about the same number of points from all events except the slow flying and take-off events (in fact, in case of a tie, the one with the highest rating in the take-off event won the contest). For example, the first five winning planes in 1934 had a spread of only 20 points in the reliability tour out of the 880 possible.

Since no points were given for cruising speeds over 131 m.p.h. there wasn't much incentive in designing an extremely clean airplane. In practice, the whole contest hinged on the slow flying events so that the planes with the lightest airframe weight and the most powerful engines had a definite advantage. (Since the weight empty was the basic qualifying factor, the lighter the structure the larger the engine.)

The winning RWD-9 in 1934, a four-place airplane, carried a geared supercharged 300-h.p. engine. It was a dirty airplane, however, with strut-braced, square wings and a fixed tripod landing-gear. It had large slotted flaps and full-span leading-edge slats, however. A RWD-9 also won second place, while fourth place went to a Czech Aero-200—also an externally braced, fixed-gear monoplane. A cantilever-wing Fieseler-97 managed to get third place—with Fowler flaps, while the very clean, retractable-geared, retractable-slatted spoiler-aile-

NEW TEST FOR DEPTH PERCEPTION

THE Verhoeff test for depth perception has been recommended for adoption by the Army, Air Force and Navy. It replaces the Howard Dolman test on which pilots pulled pegs on a string till they judged them to be in line. The new test has been proven to be more reliable than the Dolman test and is simple to use.

The device consists of a black case with a rectangular window in its front face. Through this window, the subject views four test targets (right), one at a time, which are contained inside the case. Each test target consists of three vertical bars of various sizes. One bar is either before or behind the plane of the other two bars.

The device is held toward the patient at a distance of 40 centimeters. He is asked which bar is nearest or farthest from him. When he is able to judge correctly, the device is moved back to a distance of one meter. The patient is again asked the position of the test bars. They are easily shifted and an index tells the correct position to the examiner. There are only four target combinations but by inverting the device the positions of the targets are reversed and there are then eight different tests to apply.

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THE NAME MEN FLY BY

roned Messerschmitt Me-108 picked up fifth and sixth place. Both the Fieseler and the Messerschmitt were more modern in basic design but lost the contest in the slow speed events.

Performance-wise, the times, speeds, and flying characteristics of all the first half-dozen winners in the 1934 contest were remarkable compared with present-day American personal planes—even 14 years later. However, it must be remembered that the *Rundflug* designs were specially built for the contest, carried more power than would be economically acceptable, and were not built for low cost production.

The three all-metal, low-wing, four-place Messerschmitt Me-108's entered won the ground technical ground inspection event 1-2-3, with 452 points out of a possible 500. The "108" incidently, later became an outstanding commercial success and was built by the hundreds, even during World War II, and is now in production by the French in a tricycle-geared form. (It was a sister ship of Germany's standard fighter, the Me-109, and resembles it considerably.)

The winning RWD-9 won the wing-folding event by folding its wings in 44 secs. It also won the slow-flying event at the fantastically low speed of 33.5 m.p.h. over the ½-mile course—and corrected for wind!

The Fieseler did 36.2 m.p.h.; the Aero-200, 34.5; the Klemm, 35.6, and the Messerschmitt, 38.7 m.p.h. The 5 m.p.h. difference between the RWD-9 and the Me-108, however, amounted to the difference between first and fifth place in the contest.

The RWD-9 barely lost the take-off event to the Aero-200 at 240 feet in clearing the 26-foot obstacle, and lost to the Fieseler which landed within 240 feet. The Messerschmitt got off in 322 feet and landed in 375 feet.

In the fuel consumption event, the retractable gear of the Messerschmitt cleaned up the plane so much that the 108s took all first three places by burning only 6.2 gallons per 100 miles at a speed of 124 m.p.h.

In the *Rundflug* itself, the Czech Aero-200 picked up the most points—880, with the Messerschmitt, RWD-9, and the Fieseler only a step behind with 875, 861, and 874 respectively. Their "official" cruising speeds were all above the 131 m.p.h. limit and they actually cruised much faster.

In the speed race, Messerschmitt-108s won the first three places with average top speeds at the 180 m.p.h. level over the 185-mile course.

Several contests have been held in America for somewhat similar purposes. The Ford Reliability Tour, held annually in the late 1920s, was organized to improve the cross-country capabilities of stock model small planes. The Guggenheim Contest, held in 1929, was intended to develop an ultra-safe type of plane for the amateur flyer. However, few concrete results appeared from these contests.

A *Rundflug* contest in the United States States might improve the breed of personal planes and advance personal flying by many years. It would arouse the best efforts of the industry and constitute a sporting event of national and even international interest. A sponsor would be well rewarded for his efforts. END

The author in low pressure chamber gives reactions to chief petty officer.

OVER MT. EVEREST IN A BARREL

"WE'LL go to 10,000 feet first. You leave your masks off and I'll keep mine on. We'll stay at 10,000 for a while and compare notes. . . ."

It was the doctor speaking. He was accompanying us on a simulated flight to 30,000 feet altitude in a low pressure chamber. It was my second pressure chamber flight, but this one was different. I was to act as a guinea pig to experience first hand myself the deadly effect of anoxia—oxygen lack at high altitude.

As we "climbed" above 10,000 feet, breathing seemed a little difficult. Nobody spoke; we sat and glared at each other.

"Now," said the doctor, "before the colonel takes off his mask let's review what we know of the effects of anoxia. At this altitude a man will become unconscious within two or three minutes and unless oxygen is administered will die within five minutes. When the colonel first takes off his mask he will feel okay; in fact he will probably feel happy and serene. That's one of the critical things about this anoxia business. A man suffering from oxygen starvation feels a little drunk and very confident.

"He doesn't realize his condition and he may therefore neglect to take oxygen just at the time when he needs it most."

I took off my mask. Apparently I could breathe normally, though each breath seemed to do me no particular good. My skin began to itch and crawl.

"Ah!" said the surgeon happily, "notice how the sweat is breaking out all over him. That always happens up here."

I tried to ask the doctor a question. With an immense effort I gasped out three or four words, then had to stop to inhale before I could get out the rest. The air was so thin that I could barely make my vocal cords vibrate. What sounds I could make were hoarse and almost unintelligible. I tried to relax but found I was twitchy and unable to get comfortable.

I leaned on one hand, then on the other; I crossed and uncrossed my legs, but no position gave any relief. I was acutely uneasy, but so far as I could tell my brain was still functioning normally. Nobody said anything; everyone just stared at me in curiosity.

In a last effort to get comfortable while waiting to pass out I folded my arms and leaned back to look up at my regulator for want of something better to do. To my astonishment I found myself looking up into the doctor's face, and discovered that he was clapping my mask on me and turning on the emergency valve. He seemed to be looking at me from a vast distance. I could see nothing but his face and my regulator; my side vision was gone completely. In a matter of two or three seconds, as the oxygen blasted my face, I recovered completely, my side vision returned, and I felt completely well and mentally alert. But the thing was that I had felt mentally alert the whole time.

"You lasted 1 min. 57 sec. by my count," said the surgeon with clinical satisfaction. "Did you hear me ask you what your name was? Or how old you were?"

The answer to both questions was no. I had heard nothing except my own question and his answer. One officer had waved his hand in front of my face, but I had paid no attention. The doctor continued.

"The thing to remember is that in anoxia you are in bad shape but you don't know it. And that is why the Navy arbitrarily requires oxygen to be used in all flights over 10,000 feet."

Lieut. Col. Hamilton Lawrence, USMC

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New Designation System

(Continued from page 37)

certain block number are identical. (Factory numbers start 1, 5, 10, etc. Intermediate numbers are reserved for service modifications.)

(2) Manufacturer's designation—Two-letter codes are assigned to each plant. Some manufacturers have plants in a number of cities, each with its own code. (BH, Beech Wichita; BA, Bell Atlanta; BE, Bell Buffalo; BO, Boeing Seattle; BN, Boeing Renton; BW, Boeing Wichita; CO, Consolidated San Diego; CF, Consolidated Fort Worth; CU, Curtiss Buffalo or Columbus; DO, Douglas Santa Monica; DC, Douglas Chicago; DL, Douglas Long Beach; DK, Douglas Oklahoma City; DT, Douglas Tulsa; FA, Fairchild Hagerstown; HU, Hughes Culver City; LO, Lockheed Burbank; MA, Martin Baltimore; MO, Martin Omaha; MC, McDonnell St. Louis; NA, North American Inglewood; NT, North American Dallas; NC, North American Kansas City; NO, Northrop, Hawthorne; PI, Piper Lockhaven; RE, Republic Farmingdale; RA, Republic Evansville; SI, Sikorsky Stratford; VE, Vega Burbank; VI, Vickers Montreal; VU, Vultee Downey; VW, Vultee Wayne; WO, Waco Troy.)

So let's take a once-over-lightly at a designation and review the translation:

C-54B-1-DC

C —The *T*ype, Cargo.

54 —The *M*odel, the 54th cargo type ordered by the AF.

B —The *S*eries, different from C-54*A* aircraft because more of the fuel is carried in the wings and the load space is larger.

1 —The block; all 120 airplanes of this designation were identical.

DC—The manufacturer, *D*ouglas, *C*hicago. The second letter defines the city when one manufacturer has a number of plants.

These principles of aircraft designation apply to both the old system and the new. However, under the new system, letters are assigned to *all* production series, including the *original*. For instance, under the previous system, "B-29" could mean the first series, or "plain" B-29s, or it could mean *all* aircraft of the B-29 model. Now, the term "B-36" will be used to include all the series of that model; B-36A is the first production series of the B-36 model.

The following types of aircraft will no longer be designated as previously: Attack, Amphibian Observation, Pursuit, Emergency Rescue, Rotary-wing and Photographic. Nor will trainer aircraft be subdivided as PT (Primary Trainer), BT (Basic Trainer), and AT (Advanced Trainer). Added to the list of fundamental type designations are Amphibian, Fighter, Helicopter, and Reconnaissance.

Letters are used to denote the *basic design* function of an airplane, and under the new system, will *stay* with a ship, regardless of changes or modifications for different uses.

Much wider use will be made of prefix symbols to indicate modification for current usage. Previously, a B-29 modified for photo work became known as F-13. This led to complications in issuing operating data and directives. At one time, B-24s went under the guises of: C-109, F-7, AT-22, and B-41 (multi-turret fighter version). Under the new system, those same aircraft would have been known as CB-24, RB-24, TB-24, B-24.

See how much simpler life is already.

Many of the prefix symbols are the same as the fundamental type letters: B, C, F, G, L, Q, R and T. Other prefixes include:

D—Director—aircraft modified to *direct* guided missiles or remotely controlled aircraft. (Previously known as CQ type).

M—Missile—aircraft modified as guided *missile;* radio-controlled drones guided to a target.

S —Sea Search—aircraft modified for air-*sea* rescue or sea-search work, as when droppable lifeboats are attached.

V —aircraft modified as staff administrative transports.

Only in exceptional cases will more than one prefix be used. When an F-80 is modified for reconnaissance purposes it becomes an RF-80. If more than one prefix symbol is used, the first symbol from the left is the primary prefix symbol and the next one is the secondary prefix symbol. Total number of prefix symbols never exceeds three.

Some of your old favorites will get new designations under the new system. First example is the A-26 (Douglas *Invader*). Now known as a bombardment type, it will be called *B*-26, and should not be confused with the obsolete older B-26, the Martin *Marauder*. All such re-designations will retain the model *number*, changing only the type *letter*. Other examples: P-51 *(Mustang)* becomes F-51; P-80 *(Shooting Star)* F-80; P-84 *(Thunderjet)* F-84; R-6 Sikorsky H-6; AT-6 *(Texan)* T-6; F-11 Hughes R-11; F-6 *(Mustang* photo version) RF-51.

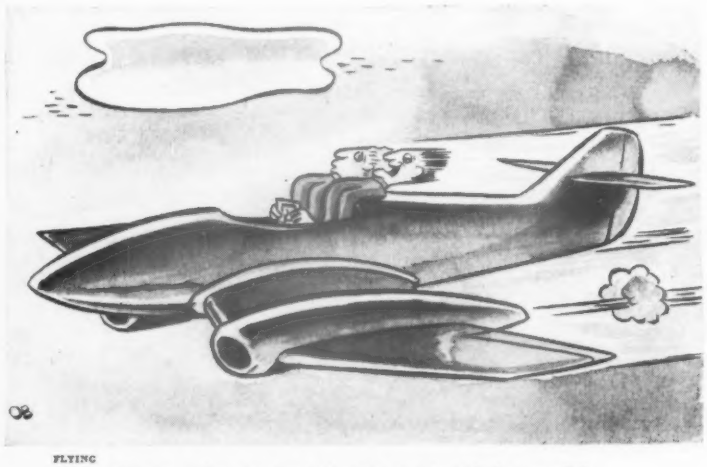
Notice the difference between the re-designation of the last two: The F-11, which was basically designed as a photo ship, retains its assigned *number*, and becomes the R-11. However, the F-6, a *Mustang* P-51 modified for photo work will be re-designated as a *R*econnaissance *F*ighter, RF-51.

Only exceptions to the re-designation program are the BT-13 and the PT-13. Basic Trainers are being removed from service but while both are still used by the Air Force they will retain their original designations. When all BT-13 aircraft are "retired" from the Air Force, the *Kaydet* primary trainer will become *the* T-13.

General classification symbols will sometimes be used in front of prefix symbols so that some three-letter designations may be adopted. Classification symbols are: E exempt, on special tests or experimental projects; X, experimental, a test article of a new model or series; Y, service test, a small quantity procured to explore the potentialities of a new model or series; and Z, obsolete, no longer suitable for first or second line use. For example, an Experimental Reconnaissance version of the B-36A would be called XRB-36A; Service Test articles might be called YRB-36A; but the production version would revert to two letters, RB-36A.

You've probably wondered about the large letters and numbers painted on the wings and fuselage of all Air Force planes. These are intended to name *each individual* plane with a symbol visible from a great distance. The first letter is the type, B for Bomber; the second letter stands for the model—in the case of the B-29, the letter is "F." (Letters are used instead of the original numbers so the total number of characters can be kept to five—larger letters mean greater readability.) The three numbers are the last three digits of the serial number. So "BF-569" is a specific B-29. A few you'll want to memorize are: BF for B-29; TA for T-6 *(Texan)* the old AT-6; FN for the F-80 *(Shooting Star);* FS for the Republic *Thunderjet*, F-84.

So, now you've got it all straight, haven't you? The *t*ype shows *basic design function;* prefix letters show a modification for current usage; *classification* symbols show the status. The *m*odel number tells the basic configuration and construction. The *s*eries letter indicates *major changes* in the model; while the block number denotes minor changes in the series. The pair of letters on the end of a designation point to the manufacturer and his plant. END



FLYING

"It was such a nice day I decided to ride with the top off."

BUILT TO TAKE HEAVY DUTY PUNISHMENT

STURDIEST LANDING GEAR! Only the *Ryan Navion* gives you *all* these safe, practical features for landing and taxiing: 1—Nosewheel is *steerable* and as big as many main gear wheels; 2—High ground clearance; 3—Over-size tires; 4—Wide wheel tread; 5—Husky, deep-stroke shock absorbers; 6—Extra powerful, equalized hydraulic brakes. You can drop a *Navion* in hard with utmost safety... maintain splendid control in cross winds... taxi smoothly over rough fields.

Ryan Navion Combines Maximum Safety with Utility in a Thoroughly Modern Design

Designed for the average man to fly and land anywhere, the 150 mph *Ryan Navion* gives quick take-offs and fast climbing. Performance is outstanding from improvised fields and at high altitudes, even when fully loaded. Optional auxiliary tank increases range to 750 miles. You get exceptional stability even in rough air. *Navion's* stall-resistant wing gives full aileron control at speeds so low it will amaze you. High-lift, full-deflection flaps put the *Navion* down for by far the shortest, slowest landings of any plane in its class.

All four passengers enjoy fine car comfort. Luggage compartment can hold 180 pounds with more spaciousness than most sedan trunks. For easiest bulk cargo loadings and easiest rear-seat passenger entrance and exit, *Navion's* exclusive canopy rolls way back. Visibility is a full 360°. Sound insulation and ventilation are finely perfected in the 1948 model.

Only an actual demonstration flight with *your* hand on the wheel can fully display the *Navion's* intelligently chosen and well-engineered combination of features. For free business trip, demonstration or illustrated booklet, write us today on your letterhead.

THICK, ALL-METAL SKIN gives rugged strength... durable enamel finish means permanent beauty, lower maintenance cost. Choice of 4 striking colors.

SELECTIVE 2-CONTROL SYSTEM. Smoother, more relaxed flying even for beginners. Steer with wheel alone or with rudder. Automatic coordination!

The Thoroughly Proven Post-War Plane *Ryan Navion*

Rely on Ryan RYAN AERONAUTICAL COMPANY 108 LINDBERGH FIELD SAN DIEGO 12, CALIFORNIA

Memoirs Before Take-Off

(Continued from page 25)

where the two stewardesses are standing by the door, trim as wienies. You both make a remark or two, more or less vulgar, to show the girls that you are not insensitive to their charms—this is your duty. You go to the front end, and try to think of a place to put your bags where they won't be trampled upon, or loaded under some crates of stamping mill castings, or carried off and lost, but you try without hope for this is a problem that you have never solved.

The co-pilot enters the cockpit and begins to go through the general check list, there being a few hundred switches, circuit breakers, valves, and devices.

You dismount and look at the tires which cost some $1,200 but can last about six landings, more or less, if the propeller reversing does not work as it should. You look at the right landing gear strut to make sure it is down far enough for the micro-switch because if it is not well down you can't use your reversing until you don't need it. You get one of the mechanics to bleed it a bit. The brake pads are good for about six landings also, that is, six no-reverse landings; you check them for wear. You check the brake cylinders. Then you raid the galley for coffee; it's sure a comfort to be a pilot, you get all of the coffee you need.

You go back into the cockpit and go over the squawk sheet upon which the previous pilot of that ship had set down everything that was wrong with it. On the back of the sheet the maintenance people have noted what was done, item by item. Of most items they have set down, "Noted." That is good. It is relaxing.

There are quite a few notations because the DC-6 is a new plane and the bigger the plane the more complications. There is nothing down about the fuel tank gauges which are so bad that nobody writes them up any more. An outsider, or ignorant layman, might think that gauges which would tell a pilot whether he had fuel enough left aboard to get to a certain place, would be a good idea. But it can't be important because the gauges on the DC-6 are worse than any that have ever been used. Besides the engineers are wonderful, like we have been so often told, and they could lick such a simple problem if it were of any importance. You look up the figures on your private note book and you see that so far over half of the fuel gauges have been off more than 20 per cent; that it is usual for a gauge to show 100 or 200 gallons in the tank when the tank is empty.

In addition to the hysterical gas gauges you have the fuel consumption of your engines to take into consideration. Your note book tells you that in a little over half of the DC-6s you have flown the engine gasoline consumption has varied by 30 per cent as between the lean engine and the rich engine. The result is that you have to time your gasoline consumption on your clock and carry enough so that you won't land with one or more dead engines; you must calculate as though each engine were as rich as the richest engine, and that means that you estimate all of the fuel you will need and then you must add 22½ per cent. You idly wonder how rich the air lines must be to crowd all that pay load out with useless gasoline.

Now comes a curious process. You sit quietly for a few moments. An observer would think that you were dreaming. In a way that is what you are doing. You fly your trip before you take off. In your mind's eye you go through the whole thing including various possible conditions of the weather, the radio, and the mechanical condition of your aircraft. You know that there will be a number of such things and you consider the combinations that are likely. If a foreseeable emergency does occur you can take instant action without thinking the matter out when there is no time to do it. You have thought it all out beforehand.

You wake up. The passengers have been loaded. An efficient looking man in uniform takes his place by your window. The co-pilot finishes his checks of the radios, the HF, the VHF, the ADFs. Now out comes the freight and express loaded in little flat cars towed by a baby tractor. Snorting men dash into the baggage compartment just aft of your seat. Men on the ground send boxes and crates up to them on an escalator. It is all so efficient. There is a lot of freight because the airlines are trying to build up the business and have cut rates below costs.

Soon the bins are pretty full of freight. Here comes the last stuff, the baggage, but it is a job to fit the pieces into what little room is left in the bins. One baggage escort runs hither and yon shoving a bag into unlikely holes. This takes time. Aha, here is a hole that looks likely. He thrusts the bag into the hole but it doesn't quite go.

He enlists momentum on his side and slams it but for some perverse reason it still refuses to go in. He fits one end in, aiming it well. Then he place kicks it. By this time the escalator has filled the passage-way behind him with more bags, and some hat cases that the maker did not have any idea were collapsible. "Hold it, hold it!" our man cries, using a few well-chosen adjectives. The men on the ground hold it.

Our man pulls much of the freight into the aisle, and then, replacing it in the bins, tries again with his bag. There are several dozen bags yet to come and it should be clear even to a detective that there is not room for half of them. But they have to go on the trip because the passengers have become sensitive to having their baggage left behind.

You are now 10 minutes late. The men hold a conference and they are despondent because the manufacturers are making bags these days that defy any ordinary efforts to dispose of them. So they decide as they always do: unload the freight, put the bags on, and then load what freight will go into the room that is left over. They unload the freight. You are 20 minutes late. The passengers are now wondering if it is the plane or the pilot that has broken down. Well, it's done. You are 30 minutes late.

Suddenly there is activity on the ground. A mechanic armed with a red blunderbuss that is really a fire-extinguisher takes up a threatening position and aims his piece at Engine No. 3. Three men close the cabin door and wheel away the boarding-ladder. A man dressed in a natty uniform marches to a position to the left of your cockpit window and seven paces in front of Engine No. 1. He executes a right face, pulls in his stomach, and comes to attention. You are now going into the Act.

The uniformed lad holds up three fingers of his left hand and with the forefinger of his right hand he draws little circles in the air. This means that you are to start Engine No. 3. The co-pilot turns the selector switch to "three" and puts on number three pump, an electric pump for the gasoline, and he presses the starter button and the engine begins to turn over. You have to help him, so you put down your copy of Gibbon's Decline and Fall of the Roman Empire, carefully marking your place.

After the engine has turned over twice to clear the cylinders of possible oil and gasoline accumulations which, because fluids are not compressible, might wreck a piston or a connecting rod, the co-pilot calls, "Switch." You put on the ignition switch; your co-pilot touches the primer button

15 YEARS AGO

FROM the August, 1933, issue of this magazine:

First flying wing to fly successfully in the United States was the "Arup," designed by Dr. Snyder, South Bend, Ind. Powered with a 40-h.p. Continental engine, the tailless plane reached the 100 m.p.h. mark in its test flight, showed ability to zoom sharply and to climb at a fair rate of speed. The wing, of wooden construction, had a span of 19 feet and an area of 211 square feet. Landing gear was unusually high.

England's famous aviatrix, Lady Grace Hay Drummond-Hay, bought a new Waco four-place cabin plane before she returned to England. Her reason for choosing an American-made plane was that England had not yet developed the type of medium-sized plane she needed.

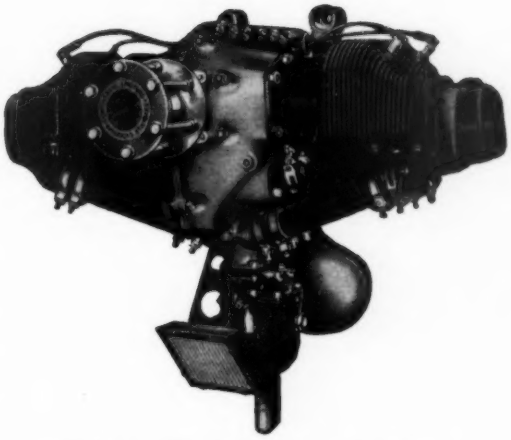
The airobot, an automatic pilot, was perfected by United Air Lines. It was claimed to be the first successful robot pilot to be developed and operated by an airline.

The Piano-Helicopter was developed by J. F. Sellmer of California. It was designed to rise and land vertically and thereafter to fly like a conventional airplane. The helical screw rotated so that it would exert lift, and when folded flat could be used as a normal wing.

Air express started to ship live stock. Fancy gold fish was shipped to Latin America by Pan American Airways and 4,000,000 bugs were brought from Peru to Louisiana to get rid of the sugar cane parasite. Hatching eggs were forwarded from Miami to British Guiana.

Two Great New CONTINENTAL ENGINES

Continental Motors is now in production on new 90 and 145 h.p. aircraft engines. These new models, designated the C90 and C145, are not "souped-up" versions of other engines, but have increased displacement and attain their full horsepower at relatively low engine speed. They have been introduced in order to round out the Continental line, which now includes 65, 85, 90, 125, 145, 165 and 185 horsepower models. Both have highly favorable weight-to-horsepower ratios, and both will soon be in service in a number of new planes.



NEW CONTINENTAL C90 — This is the 90 h.p. modification of the C85 that powers so many personal planes. As with its 6-cylinder counterpart, the increased power results from increase in displacement, and other changes.

NEW CONTINENTAL C145 — This 6-cylinder 145 h.p. engine is a modification of the tested and proven C125. Increased displacement develops the extra power at moderate engine speed.

CONTINENTAL SERVICE AND PARTS... *Near* as Your Nearest Airport

Not only in North America, but throughout the world, adequate stocks of genuine Continental parts are available. Wherever you fly, you will find the rugged dependability of Continental engines backed up by service and parts. WRITE for free copies of bulletins, giving the specifications of the C90 and C145 Continental engines, as well as the name of the Continental dealer nearest you.

Continental Motors Corporation
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ENGINES

Can You Name Them?

Here's your chance to do a detecting job. These little-known photos of aviation "greats" shouldn't give you much trouble.

It took him only 33½ hours to gain a permanent place in aviation's hall of fame

Controversial figure of the middle 1920s, he is considered an aviation seer.

Most persons don't know he amazed world by staying aloft 150 hr. 40 min.

Air Force corporal learned to fly, ended World War II as a combat colonel.

Veteran airman was married in plane by a minister standing on wing.

Left to right: Charles A. Lindbergh, Gen. William E. Mitchell, Gen. Carl Spaatz, Jimmy Stewart, Col. Roscoe Turner.

as needed. The engine begins to fire. "Firing," he calls, and you move the carburetor lever from Idle Cut-off to the Auto Rich position, working the throttle to keep the engine running but not so fast as to blow over things behind your tail. When it is running evenly, you start No. 4 engine. To start No. 2 you and the co-pilot exchange duties because you can see out the left window and he cannot; you start No. 1.

The military one, he of the finger signals, stands up very straight, stomach in if possible, jaw out, and raises his right hand for a snappy salute. The salute means, "For the love of Mike, get out o' here." But he doesn't complete the salute. A uniformed man rushes out of an office door, dashes up to him, and whispers in his ear. The ramp agent looks incredulous. He faces you again and draws his finger across his neck. He is not describing the airline business. No. He is telling you to cut the engines. You move the levers to Idle Cut-off, the engines stop, and you turn off the ignition switches.

Everyone on the ground disappears as if someone had passed the hat. The Act is over for the moment and the stage is deserted. No one tells you a word—you are just the pilot. So finally you get up to go see what the hell.

You dismount and go to the office, the one where the papers are shuffled. "What is it this time?" you ask of one of the least desperate-looking of the men among the teletype-writers and pencil sharpeners.

"What you on?" he languidly inquires without looking up.

"Flight seventeen seventy-six," you reply.

"Oh, you're the bad count or the overweight, I don't know which," he replies.

If you are the bad count it means nothing romantic, just that the number of passengers or the number of bags do not add up to the calculations—usually it means that you don't have the right number of wrong bags aboard. If you are the overweight it refers to the airplane and not to you personally, and some passenger is likely to be asked to deplane himself.

The ramp agent is a real diplomat and he always picks out a little fellow to kick off, and you wonder what difference such a few pounds can make. Bins are opened, freight and baggage unloaded again, and then the air liner is reloaded, heads are scratched, new papers are made out.

Suddenly another riot breaks out around your plane. You are going into the Act again. The trim mimes march once more to their places. You saunter aboard, showing that you, at least, are calm. The Act completed, the engines are again clanking away.

The ramp agent salutes smartly. You pull the air liner ahead three feet and stop. What good does that do? You have departed; officially you are on your way. Now if someone whispers to the ramp agent it doesn't count. You can't go yet but you have "departed."

The co-pilot and you put on your head sets, the receivers. He tries to talk to the bird in the traffic tower, who can speak while breathing in as well as out. He sounds like a tobacco auctioneer caught with the maid. He is a busy fellow. Incoming air liners are reporting position, getting instructions, reporting again. Outgoing air liners are getting clearances, take-off instructions. Taxiing airplanes, even when moving around the outer rim of the field, have to call in for permission before crossing the end of each runway and there are lots of ends to call in about. You think how carelessly the word "madhouse" used to be applied.

The co-pilot says into his microphone, "Chicago Tower, this is Merry Can seventeen seventy-six. Taxi instructions." The man in the tower doesn't answer, but you didn't expect him to. This is just the warm-up part of the procedure. After a few moments the co-pilot tries again, with the same result.

After a while the tower says, "Who is calling from the ramp?" He knows, but that is part of the ritual.

"Merry Can seventeen seventy-six; La-Guardia, nineteen thousand, no ATC."

"Cleared to runway three one right, check before crossing two seven right, and stay clear of two seven left. Wind . . . where are you Cistern Airline eighteen twelve what altitude holdshortoftwentysevenBeesternfiftysixshiptakingoff . . ." You have often wanted to tell someone about such things as this, the bedlam, the misunderstandings, the pretense of sanity, but you never have. No one would believe it.

You can't taxi yet anyway. The ramp and the taxi-way are too small, and they are blocked by air liners outgoing which are blocked by air liners incoming. Eventually the block is cleared. You have permission to taxi so you inch your way along just scraping airplanes and trucks parked on both sides of your way. You have to go slow with this swiftest form of transportation. When you get to runway thirty-one right, you call the tower for permission to cross it. Of course this is the runway that he instructed you to use for your take-off but it is much too short for you and he knows it. The tower often assigns a runway that is too short. It is a sort of little IQ test that he gives. Once in a while a naive pilot will try to take off on the short one and this livens things up a bit.

You near thirty-one left and you have to run up and test your engines, but the people who design airports don't know that engines have to be run up and so there is no place to do it. You put the problem up to the bird in the tower, "Where do you want us to run up?" He says, "Right there, Merry Can." Well, he said it. Your tail is pointed toward thirty-one right and you can't see out of these air liners to the rear.

You run up No. 4 engine to 15 inches of boost, check the generators, the carburetor heat, the electric propellers. Then you run No. 4 engine up to 30 inches boost, check

head temperatures, oil temperature, oil and fuel pressures, high blower and low blower, then the switches. You do this with No. 3 and just then over the racket of your propeller you hear a frantic, "Close your throttles, CLOSEYOURTHROTTLES MERRY-CAN, United Air Lines is landing behind your tail! ! !" Likely a DC-3 on the short runway, you think, but you will never know —you can't see him. You do know, though, that the prop wash from your big 2100-h.p. engines would crash him. You sigh.

The co-pilot, after the engines are tested, reads off the take-off check list item by item, and you check the thing referred to and call out what you find, and each time he looks too because he has learned not to trust nobody no time about nothing. This procedure takes about three minutes, or perhaps less.

Usually the tower gives you your airways clearance when one of your engines is running up so that you can't hear him but this evening he is too busy. Here it comes; you are told how to take-off, which way to turn, how high to fly for how far, where to climb to your altitude, what route to take, what zigs and what zags.

The co-pilot wipes the sweat out of his eyes, and says into his microphone, "Merry Can seventeen seventy-six ready to go."

The tower, "Cleared for take-off, thirty-one left, right turn out."

The co-pilot unlocks the controls and he tests the full sweep of the elevators, the ailerons, the rudder. You unlock your brakes. Using the tiny steering wheel by your left knee you roll out onto the runway and head her straight. At this point you check the controls yourself. Both of you crane around to spot what you can of any air traffic because you know that you have the ability to see only somewhat less than 10 per cent of the visual sphere out of your blind craft.

You call, "Controls free?"

"Controls free."

"Take-off power."

The co-pilot advances the throttles to 30 inches of boost. "OK at 30," he calls out. You both quick-check the fuel pressures, the oil pressures, the head temperatures, the r.p.m.'s.

Then he opens the engines full out, and if you in your imagination have flown your trip carefully and ably, this is not the END

AND THERE I WAS . . .

KEEP IT QUIET

THE weather-beaten Texan was an instructor at a twin-engine transition school during the war, and his student was nervous. Cruising at 8,000 feet, the instructor cut off the starboard engine mixture.

Quickly, the student applied more power to the port engine, and trimmed the plane. Then he remembered he hadn't shut off the dead engine's switch. He reached up quickly, threw the switch, and the *port* engine sputtered out. Flabbergasted, the student waited for the instructor's wrath:

The lanky Texan leaned back in his seat, grinned, and drawled:

"Quiet—ain't it?"

ROBERT FABRIZE

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Safer Plane

(Continued from page 38)

private flying—there seems only one answer: Wider margins of crash protection must be built into planes for inexperienced pilots. De Haven feels that a truly safe plane would affect the public's attitude toward flying in ways that would benefit the whole aviation industry.

Recent CAA figures show that more than 80 per cent of the dangerous accidents in private flying are caused by stall-spins and collisions with such objects as trees, wires and fences. In most accidents of this kind the ship is washed out but in a surprisingly large number of cases—and with virtually no designed crash protection—persons have withstood crash forces that demolished all parts of the ship, including the cabin.

Analyzing types of injuries, the Cornell unit found that head injury was by far the most frequent cause of fatalities in survivable accidents. Surprisingly, less than one per cent of the survivors suffered internal injuries of the chest or abdomen in spite of the fact that many of them had been thrown forward with sufficient force to break 2,000-pound safety belts. The neck, chest, and abdomen apparently can withstand forces of extraordinary violence. Fractures of the legs and arms were frequent but these injuries normally are not regarded as dangerous.

Collapse of cabin structure and dangerous injuries of the head are crash hazards the Cornell unit feels are subject to a large measure of control. Obviously, if the body's remarkable strength could be exploited and the head protected, the present rate of fatalities in survivable accidents would be cut down very considerably. Holding the head and body in place so that they cannot strike against rigid or solid structures inside the cabin would have meant the difference between "walk-away" and fatal results in many crashes.

The Cornell studies showed that safety belts, far from cutting people in two or causing internal injuries, are the most effective safeguards against being catapulted into forward wreckage or through the side of the plane.

Looking at crash data in which the safety belt failed to hold (47 per cent of the severe crashes studied), De Haven recommended that the entire safety belt assembly in lightplanes be greatly strengthened. As a result of crash-injury studies, officials have recommended that individual safety belts henceforth provide holding capacities of 4,000 pounds.

New safety belt standards have been proposed which call for a holding capacity of 6,000 pounds. No agreement had been reached by CAA and the industry as this was written regarding increased strength for the belt's anchorage points. The present requirement for 850-pound anchorage points must be increased or the stronger belts will be ineffective.

Shoulder harness, with an automatic crash lock, provides a tremendous increase of safety in accidents. A safety belt checks the momentum of the lower parts of the torso, protecting them from injury, but nothing checks the velocity of the head unless a chest strap or shoulder harness is used. In most accidents the head smashes into the forward structure with the full velocity of the crash.

The Cornell unit feels that, with greater understanding of its function and value, shoulder harness will be used eventually in private flying. Lack of understanding, psychological factors, and difficulties of harness installation prevent widespread use of harness in private flying today.

De Haven believes instrument panels, control wheels and seats can be redesigned to give more protection.

The skull is not likely to be fractured if it hits a broad, yielding metal surface, according to findings of the Cornell unit. Research therefore has been undertaken to find what thickness of metal in instrument panels and other structures the head can strike without danger. Panels should be free of protruding knobs, handles and cranks. Bracings, tubes and solid objects should not be placed immediately behind the panel, and its edges should be rounded. Heavy objects in the panel capable of causing serious head injury should be so installed that they will shear free of the panel under heavy crash forces.

The Cornell unit also proposes a safer design for control wheels, which often slam forward against the instrument panel, becoming a hazard to the head. It suggests that the wheels be made of strong material which will distribute loads on the chest without breaking. They should be equipped with an inertia drag or lock which would check rapid forward movement of the push-pull tubes in a crash so that the wheel would "catch" the pilot and provide semi-shoulder harness effects.

Along with President Truman's Air Safety Committee, the Cornell Safety Group sees great virtue in rearward seating but recognizes that in all planes the psychological disadvantages outweigh the "safety net" features of seats facing aft.

Instead, it is urged that passenger seats in small planes be placed as far as possible to the rear, and that forward seat backs be designed to pivot forward 30° to 40°, thus cutting the chances of rear seat passengers striking their heads or necks on the backs of forward seats.

Along with a rugged cabin that will be an "island of safety" for the occupants, the Cornell researchers urge greater "crash-worthiness" in surrounding structures. If landing gear, engine mounts and forward sections are strengthened by even a few pounds of additional structure and the wings made successively stronger from tip to root, the plane and occupants will stand good chances of survival in many types of crashes that are fatal today.

Personal aircraft manufacturers are now at work on safety designs suggested as a result of accident-injury studies. However, no one plane on the market today incorporates all the recommended safety measures.

Almost all manufacturers, however, are inclined to go along with De Haven's proposition: Unless lightplanes are designed to give greater safety in *accidents*, all other factors such as utility, low cost, ease of maintenance and low operating expenses will not mean much. To be more popular, flying must be safer. END

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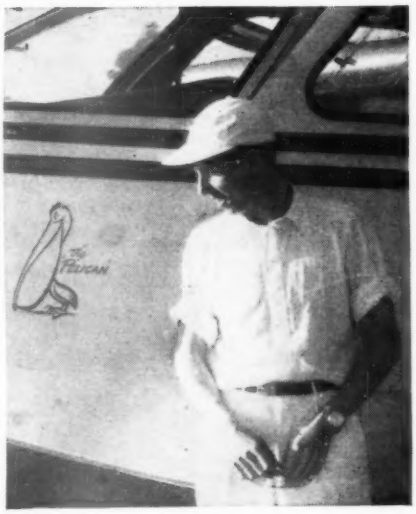
Says member-pilot ROBERT P. LAMONT



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Pilot Robert P. Lamont
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This is Skyway One

(Continued from page 43)

Most of the Indiana airports on this leg of the route were marked.

When we arrived at St. Louis, Paul Vance of the local Chamber of Commerce outlined an ambitious airmarking program for the city, which will include five official Skyway markers on prominent buildings. Vance and his associates are painting the signs themselves in their spare time.

St. Louis to Abilene, Tex.—We made this 700-mile hop with a short break at Oklahoma City, after a contact flight through overcast with considerable haze. Best altitude for winds was 6,000 feet, and since we were on top I was anxious to see airmarkers through the broken clouds. At one point I hadn't gotten a fix for an hour and a half, though I saw occasional small towns —all unmarked. Finally, I saw a small town under broken clouds to my right. A building had white markings, "CARTHAGE MARBLE"—and after scanning the map for a town called Carthage and checking the terrain pattern, I established myself at Carthage, Mo., about 250 miles out of St. Louis.

I offer as a suggestion to groups having difficulty financing the markers, to get local industries to put the city's name on buildings, together with the name of their product. The city and state should be indicated, even in abbreviated form, and the official Skyway emblem should be sponsored in addition to such secondary markers. (For these procedures, write to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., asking for copies of Civil Aeronautics Bulletin No. 12, entitled "Air Marking." Price is 20 cents.)

With the Carthage fix, I corrected heading to the left for Oklahoma City. The Tulsa and Oklahoma City skylines are so distinctive in conditions of good visibility that their identity is obvious before you reach them. We landed at Will Rogers Field, and after refueling continued to Abilene, where the northern and southern sectors of Skyway One meet. There, we learned that eastern Texas is fairly well air-marked but that western Texas still has a big job ahead.

Abilene to Phoenix—The next leg was 770 miles long, with a scheduled stop at Tucson, 660 miles. I had seen a picture of the Midland, Tex., marker while in Abilene, and watched for it carefully. But as we passed over, with the city visible on the left, I couldn't see the marker anywhere. In this connection I have a suggestion: standard locations for markers could be specified to be within one-quarter mile radius of the center of the city and, when possible, on the railway station. The only markers I saw in western Texas were the CAA beacon lights, radio facilities and the natural terrain markers such as Guadalupe Pass which can be seen for 50 miles on a clear day.

We landed at Municipal No. 2 in Tucson and were met by the Tucson *Daily Citizen* and representatives of the Chamber of Commerce. Our fourth overnight stop was at Phoenix, where we were held up a day by a cold front which moved across Arizona, producing dust storms and grounding most private flying. The delay was pleasant, though; we needed the rest.

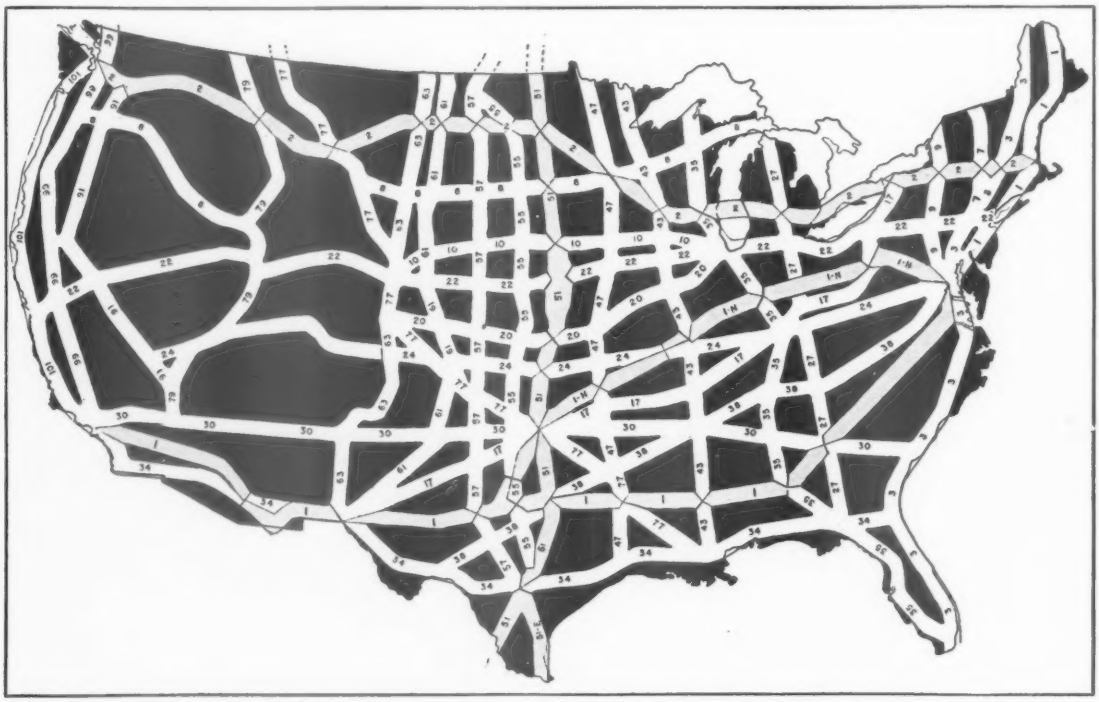
Hot deserts and mountains in western Texas and Arizona produce much turbulence, and since my wife and oldest daughter are subject to airsickness I got a supply of Trip-Eze gum. It worked wonders and for the first time since my wife has been flying she was able to enjoy a trip in rough air.

Phoenix to Los Angeles—The first town on our 350-mile leg to Los Angeles was Blythe, Calif. It wasn't marked, nor for that matter were any of the cities over which I passed, though I saw CAA range stations and beacon towers en route.

We landed at Los Angeles Municipal Airport for the Wright Way dedication ceremonies there, then hopped over to Slim Kidwell's Central Airport. For our four-day stay, we obtained a room at the Hotel Hollywood, but reserved a Sky-Motel room for our last night to facilitate an early morning departure for the east. The room was very comfortable, with radio, shower and roll-a-bed for the children.

Los Angeles to Dallas—Early on the morning of April 29, we taxied the ship up to the Motel door to load baggage. Then we grabbed a quick breakfast at the adjoining restaurant (open at 6:30 a.m.) and were off at 7:30, climbing gradually to conform to the rising terrain. A 1,000-foot clearance provided a spectacular sight as we rose over the green side of the mountains and cities before arriving at Palm Springs Pass, where the sandy desert begins. After passing Palm Springs we cruised at 11,000 feet to avoid turbulence.

Approaching El Paso Municipal airport, which has exceptionally long runways, we encountered a whirlpool dust storm (Texans call them "dust devils"). It passed along the runway during our flare-out, and to prevent disturbance in the landing I ap-



Proposed U. S. skyways will criss-cross entire nation. Shaded routes are already designated, but more airmakers are needed.

plied enough power to fly level along the runway at about 50 feet, landing when the whirling dust passed. The hot surface and 4,000-foot altitude of the airport combined to make the landing interesting, especially with a "dust devil" as an added attraction. We used the same markers on this leg as we used going west.

Dallas to Washington—On the last day of April, we made the long hop from Dallas to Washington, 1,280 miles. We found the southern sector of the Skyway well-planned but just as far behind as the northern sector. We deviated slightly from the route between Meridian and Atlanta to refuel at an airport where we could phone some friends. I was surprised to find that, though the airport was Class One, with an extensive student training program, the airport manager and operator knew nothing about an airmarking program or of the CAA Skyways program for private flyers.

At Greensboro, N. C., we spotted an up-to-date Skyway One, South, marker. And we arrived in Washington that evening, just two days out of Los Angeles, having flown only eight hours each day. We returned to our home in New York (240 miles), the next day, thus ending a coast-to-coast family vacation with ample time at Los Angeles for a short "holiday." Time away from home was only 12 days.

Cost of the trip, aside from aircraft expenses, was $195. Hotel rooms were $7 per day and we had little trouble arranging for them. Some had family rooms with three beds; others supplied roll-aways. The aircraft fuel bill was $295, and though it would be somewhat less for a light four-placer we enjoyed the larger cabin space and carried about 140 pounds of baggage—enough for the entire Patecell family for two weeks.

Looking back over the trip, I can make several suggestions:

(1) Markers should be kept clean.

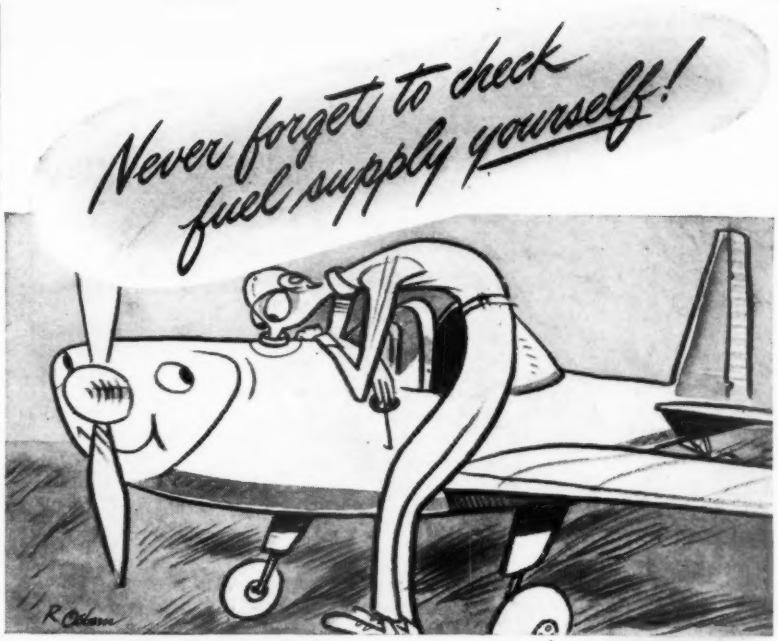
(2) Industrial markers make excellent secondary aids.

(3) A standard location should be chosen for placing official Skyway markers in towns.

(4) Large city organizations should cooperate to get small towns between them marked, particularly since the latter aren't so easily identified as large cities.

(5) There must be a systematic system for airmarking the proposed Skyways. Under the present system, if there are no towns along the route there are no markers. Private pilots' Skyways should be marked at least every 20 miles and eventually every 10 miles. (One solution, provided the project gets Government financing, is to mount a small helium-filled balloon 100 feet above every beacon tower, with a Skyway marker painted on it. This could be seen at a distance and would provide uniquely marked Skyways at a fraction of the cost of Federal highways.

My trip over Skyway One substantiated my conviction that airmarkers are tremendously important for the average private flyer. If every town in the U. S. eventually gets an airmarker, we'll all be able to fly cross-country contact with nothing more than a map and good eyesight. END



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Check Pilot

(Continued from page 27)

From the pilot's seat you have good forward visibility. The plastic windshield bulges up above the top of the fuselage, which helps quite a bit. But there are two large struts running across the windshield area and there's a wide center strip in the middle of the windshield, all of which cut down visibility a bit.

The *Sedan* is easy to taxi and is quite stable on the ground. You can see over the nose quite well; the pilot can adjust his height by adding or subtracting one of the two seat cushions. The brakes on the *Sedan* I flew (NC-1006H) were in good condition, so I had little difficulty with the airplane on the ground, despite an above-average surface wind.

My first tendency on take-off was to get the tail up by pushing forward on the wheel. It worked, all right, but seemed rather slow. After a couple of take-offs I found that the best way to take off with this airplane is to let it run in the tail-down position, get flying speed, then fly off. Actually, the tail is not down as much as it is on other conventional aircraft. The long tail-wheel strut props the tail up in a high position.

Once you figure out the take-off technique, the *Sedan* gets off the ground in about 10 seconds from a standing start, with a load. Best rate of climb at sea level, I found, is about 480 f.p.m. I made a couple of climbs to 1,000 feet from take-off, and that turned out to be the average rate.

In level flight, the *Sedan* is quite stable and easy to fly. Visibility is excellent, particularly forward. Maneuverability also is good, and the airplane has good stall characteristics, with plenty of warning. The plane I flew stalled at an indicated air speed of 53 m.p.h., both with power on and off. The air speed indicator, incidentally, is red-lined at 132 m.p.h.

My cruising speed over a triangular course was just barely over 100 m.p.h. at the normal cruising horsepower of 2,350 r.p.m. The 145-h.p. Continental apparently is an economical engine, One Aeronca pilot flew a *Sedan* for 4 hr. 55 min. before using all the plane's 36 gallons. That's an average rate of 7.3 gallons per hour, which isn't bad for a plane that size.

But the *Sedan* wasn't designed especially for speed. It is intended to get into and out of small, rough fields—and it should be able to do that with little trouble. My take-offs seemed satisfactory and the airplane is fun to land short. It mushes in nicely and, once the wheels touch, you can slam on full brakes until the wheels skid. For farmers and similar users who don't particularly care for high cruising speeds, the *Sedan* should be a good work horse.

Greatest innovation about this airplane is the all-metal wing; the rest of the ship still is fabric-covered tubing. It is the Aeronca officials' belief that the wing requires the least amount of maintenance, therefore can be metal. But the tail and fuselage, where little rips and tears are always turning up, are more easily and economically repaired when they are made of tubing and fabric. Another Aeronca innovation planned for a future model of the *Sedan* is a folding wing.

AERONCA SEDAN

Type Certificate No. A802

One 145-h.p. air-cooled Continental engine

Wing span	37 ft. 6 in.
Length	27 ft. 3 in.
Height	10 ft. 5 in.
Gross weight	2,050 pounds
Empty weight	1,150 pounds
Maximum speed	112 m.p.h.
Cruising speed (At sea level on 75 per cent h.p.)	105 m.p.h.
Stalling speed	53 m.p.h.
Maximum normal range	445 m.p.h.
Service ceiling	12,400 feet
Rate of climb (sea level)	600 f.p.m.

Source: Aeronca Aircraft Corporation

The *Sedan's* wing is of conventional metal construction. It is braced by a single strut (you enter the plane *ahead* of that strut instead of behind, as is customary with other similar aircraft). The twin landing lights are in the outboard leading edge of the left wing; both these lights deliver a total of 400,000 candlepower. While the ailerons do not have movable trim tabs there are novel metal strips along the rear of each wing tip and each strip can be bent by hand to correct wing-heaviness. Both the elevator and rudder are dynamically balanced.

Refueling of the *Sedan* presents a potential danger. You fill one tank as full as you can get it, then fill the other. By the time the second is filled, you should go back to the first, for it will take some more. Apparently a modification of the system is called for; it would be easy to think you had your full 36 gallons only to find something wrong when you tried to stretch your flight.

Another thing: you apparently can't carry much baggage, full gas and four people. It actually works out to where, if you do carry four normal people and full gas, you can only carry about four pounds of baggage. Licensed useful load is 900 pounds.

The *Sedan* should be a good competitive product in today's very active four-place market. Because of its price, and what it gives you for the money, it should hold its own. Prospective purchasers of this particular type of four-place airplane should by all means give this airplane careful consideration. END

AND THERE I WAS . . .

TARGET!

TYRO gunners were taking their first crack at air-to-air firing at an AF training base. The tow-plane hauled a yellow canvas sleeve, and gunners were marking up excellent scores.

An instructor walked up to a group of students who had just landed:

"How'd the shooting go, men?" he asked.

"Swell," answered one of the gunners. "But why was the airplane we were shooting at towing that yellow thing?"

ERIC H. COCKS

Hoppicopter

(Continued from page 28)

because the blades are counter-rotating.

The models now being tested in free flight are the third built so far. The first was strapped to the pilot's back. The second provided a landing gear and seat. The third retained landing gear, lengthened the rotors, and included a number of refinements in transmission of power and in controls. Three of the current model are being tested. Ten more, it is planned, will be constructed for additional testing.

Single-stick control is the dominating feature of the *Hoppicopter*. Conventional helicopters require special flight training, even for pilots of fixed-wing aircraft. In conventional helicopters, the pilot has one stick in front of him for direction, another at his side for collective pitch, and a foot pedal for operating the tail rotor. All these controls have been merged in a single stick in the *Hoppicopter*.

PENTECOST HOPPICOPTER

Rotor Diameter	16 feet
Blade chord	5 inches
Number of blades per rotor	2
Total blade area	13 ft. 4 in.
Disk area	201 square feet
Disk loading	1.8 lbs./sq. ft.
Blade loading	27.2 lbs./sq. ft.
Power available at 4,000 r.p.m.	
Est. crankshaft power	32 h.p.
Rotor power	28.8 h.p.
Empty weight	173 pounds
Useful load	190 pounds
Gross weight	363 pounds
Estimated hovering altitude	12,000 feet
Rotor tip speed	368 ft./sec.
Rotor speed	440 r.p.m.
Estimated top forward speed	96 m.p.h.
Estimated cruising forward speed	60 m.p.h.
Estimated endurance at cruising speed	1 hour

This simplified operation makes it easy to train pilots, and should enable the average person to learn to fly quickly. The controls are highly sensitive and the pilot has an arm rest to provide a sort of arm fulcrum and guide.

Horace Pentecost, the *Hoppicopter's* designer, was a research engineer with General Electric for six years, and for 1½ years did preliminary design engineering work for Boeing. He has been working on the *Hoppicopter* for the past three years. His company was organized in 1945, and 11 mechanics and engineers are now working for Hoppi-Copters, Inc., at Seattle.

The machine is seen as most valuable in reaching close-in isolated places—such as those sought by mining prospectors, hunters, forest patrol, border patrol, trappers, and so on. It would have value for photographers, surveyors, and crop-dusting. Inquiries have been received from all parts of the world, including missionaries in Borneo, Malaya and East Africa.

Months of test-flying, checking the machines, modifications and improvements are still ahead for the *Hoppicopter*. The craft's engineers are confident, however, that here they have a long-sought answer for safe, easy and cheap air transportation. END

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Air National Guard

(Continued from page 19)

bardment squadrons. Each type of squadron is supported by an air service group detachment.

One of the most essential units within each wing is the aircraft control and warning group. This unit, originated during World War II, is equipped with the most up-to-date and powerful types of radar, HF and FM radio. Its personnel undergo intensive training in making them capable of controlling all aircraft flying over the wing area. The equipment can give timely warning of the approach of enemy aircraft from a distance of several hundred miles beyond the wing area.

The strategically located 66th Wing, with its Headquarters in Chicago, for example, encompasses the states of Illinois, Wisconsin and Michigan. The wing is so organized that the aircraft control and warning units under its control would detect the approach of any enemy aircraft and surface vessels, relay the information to the wing tactical air control center, which in turn would immediately alert all air squadrons in its area and promptly notify the appropriate Army headquarters.

The 12 wing headquarters are so located as to provide the greatest possible protection to the 12 largest cities of the United States, which generally are assumed to be among the most vulnerable targets of an enemy's air power.

Since the location of our wing headquarters, and their subordinate units, demands proximity to the large cities, a problem has existed in the procurement of adequate installations for the Air Guard units. Many excellent air bases which were among the nation's finest during the war, are necessarily by-passed by the Air Guard because of undesirable location.

Another factor is the density of population needed in an area to assure personnel strength for a unit. The most excellent air base, if it is located many miles away from any sizeable town, is unsuitable as an Air Guard base because of the distance Guardsmen would have to travel to attend drill.

Training in the units is conducted under supervision of the Commanding General, Air Defense Command, in accordance with standards, doctrines, and policies prescribed by the Chief of Staff, USAF. This supervision is exercised through the preparation of training plans and programs, use of Air Force training standards, supervision by Regular Air Force instructors, conduct of inspections and tests, and appropriate reports and recommendations.

Unit training consists of weekly two-hour drill periods, week-end field exercises in the vicinity of the unit's home station, and annual tours of field duty, which include target practice and tactical exercises in conjunction with other components of the National Guard, other Air Force units and with ground units.

Additional opportunities for individual training are open to both officers and enlisted men. Officer personnel may be assigned to USAF staff and technical courses at established schools, and enlisted personnel may be assigned to technical and service schools, on-the-job training within Guard units, civilian schools offering aircraft maintenance, radio, and allied courses. Another method of training is the placing of especially qualified members of the Air National Guard on extended active duty for the purpose of attending technological schools or research establishments. Any such tours of duty provide full Air Force pay according to grade.

Since it is difficult for Air Guardsmen to assimilate a great degree of training in the normal two-hour weekly drill period, it is heartening to see the enthusiasm waged in 'after-hours' training. A familiar Saturday and Sunday scene at an Air Guard base is a group of young recruits working on an A-26, or pilots taking off on training flights.

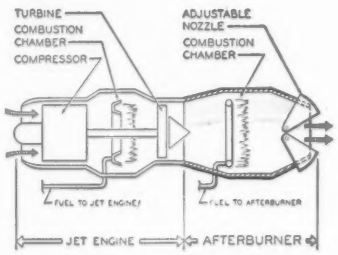
In addition to its regular training duties, the Air National Guard is frequently called upon by various states to perform mercy missions. Last year Guard planes were utilized to transport urgently-needed medicines and other essential items to scenes of floods, hurricanes and forest fires. When the ill-fated ship exploded in the Texas City, Tex., harbor last year, the Air National Guard helped speed relief from as far away as California. The 122nd Light Bombardment Squadron of Louisiana flew nine tons of medical and other emergency supplies to the stricken city. On other occasions, Guard planes were dispatched in search of crashed aircraft, lost mountain climbers and on similar missions.

Air National Guard pilots also are increasing their efficiency by taking part in air maneuvers at state fairs, air shows and

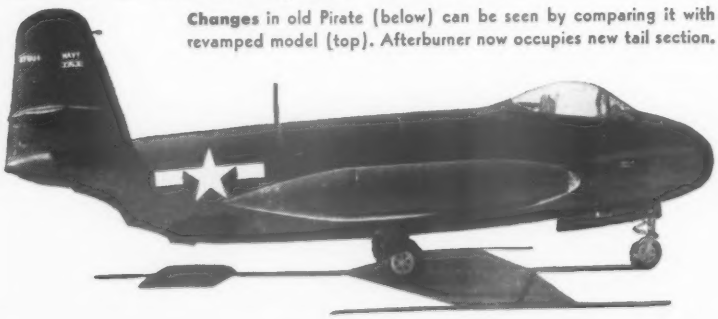
PIRATE GETS A NEW TAIL

PRODUCTION versions of the Chance Vought XF6U-1 *(Pirate)* not only have a new tail but an afterburning device in that tail to give the new Navy fighter more speed under combat conditions. The afterburner is really an auxiliary jet unit that steps up the power of the Westinghouse turbo-jet engine for short periods. The eight-foot cylindrical device is installed on the exhaust nozzle of the plane's turbo jet.

It works like a ram jet engine. Fuel is injected into the gas flows of the jet engine's tail pipe and burned in the excess oxygen at extremely high temperatures. The device, built by Solar Aircraft Company, has no moving parts and hence higher temperatures can be maintained than in the turbine proper.



Afterburning gives substantially greater thrust and is currently limited only by the ability of materials to withstand heat. The *Pirate* already was in the "over 500 m.p.h. class" and the afterburner increases that.



Changes in old Pirate (below) can be seen by comparing it with revamped model (top). Afterburner now occupies new tail section.

many other varied affairs open to the public.

Safety measures concerning flights and overall training procedures are heavily emphasized in our units. Our flying safety record compares very favorably with the records of Air Reserve and Air Force tactical units equipped with similar type aircraft.

A Personnel section and an Air Surgeon's section in the Aviation Group of the National Guard Bureau process cases involving air personnel of our units who necessarily must log a great amount of flying time to keep pace with our rigid training requirements.

We have found that many states experience difficulties in obtaining flight surgeons for newly-organized air units. In some cases, the Air Force has authorized the use of its facilities and provided temporary use of its flight surgeons. However, the need is great for medical officers, especially junior officers, for assignment to our units in administering physical examinations, checkups, shots and, in general, aiding units in assuring maximum utilization of Air National Guard personnel.

Although combat-seasoned pilots, crew men, technicians and administrative personnel make up the majority of Air Guard members, there is a need for additional young pilots. Current regulations provide that Air National Guard pilots have been rated officers in the Air Forces during World War II. However, the National Guard Bureau has submitted a plan to the USAF whereby there will be a continued flow of young pilots. It calls for a quota of Guardsmen to be admitted to aviation cadet training annually and, on conclusion of training, their being returned to their unit as rated officers.

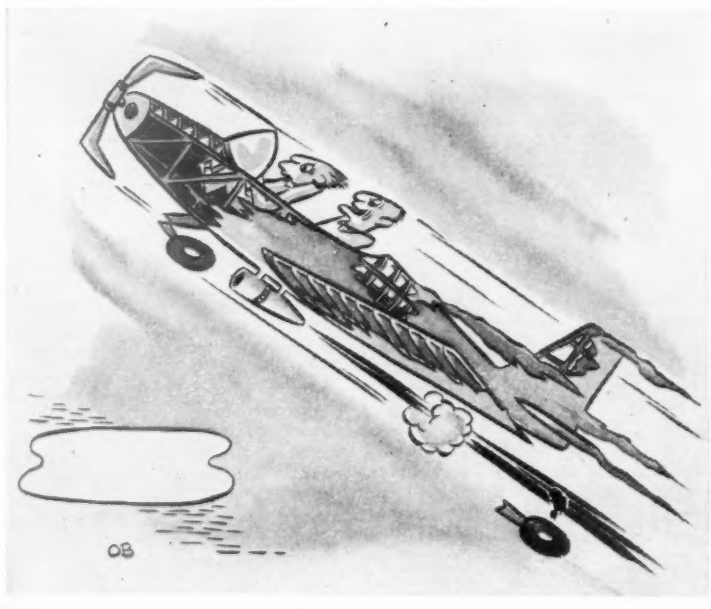
The division of responsibility in respect to operations and maintenance of the Air National Guard is as follows: The states are responsible for furnishing the personnel and 25 per cent of the cost of operation for and maintenance of air installations and storage facilities. The Federal Government assumes responsibility for 75 per cent of the cost of operation and maintenance of air installations and storage facilities, for providing pay and uniforms, and for supplying equipment and ammunition. The Federal Government, through the Department of National Defense, administers the National Guard air program, and prescribes the minimum strength and training standards for Federal recognition.

Recruiting, too, is entirely a state matter, although the Bureau has expanded its program in the past two years in giving aid on recruiting and publicity to the states. Home stations of units are determined by the states, subject to approval by the Chief of Staff, United States Air Force.

The Aviation Group normally acts for the National Guard Bureau in resolving problems involving the states and higher military commands in the Department of National Defense.

Although the Air National Guard has made rapid strides during the past two years, there is still a big task to accomplish. Skilled technicians, especially in the fields of communications and radar, are needed, along with pilots, medical officers, mechanics and crew members.

It is essential to our organization that personnel vacancies be filled, for the Air National Guard is the framework of a self-sustaining tactical airborne force which is without precedent in our history. The Air Guard of tomorrow will not be a reservist force requiring reinforcements, additional training and equipment before it can serve effectively. It will be a force in being, ready immediately if our nation is attacked. END



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Unification Is a Flop

(Continued from page 16)

setup. Power must be centralized in the office of the Secretary of Defense rather than in the relatively independent Secretaries of Army, Navy and Air Force.

To understand the whole picture it is necessary to go back to the time of Gen. Billy Mitchell and his fight with the Army and Navy which led to his five year suspension and subsequent resignation from the Service. Mitchell wanted autonomy for the Air Force, and his followers never gave up until they achieved their goal.

There can be no doubt that during the 20s and 30s, the Air Force was kicked around by the stronger Army and Navy. They didn't get much of what they wanted until World War II started. It is understandable, therefore, that the Air Force pressed for autonomy where it could not be ruled by the older services.

Paradoxically, however, World War II showed the need for a unified command. It also showed that the Air Force will be dominant in any future conflict. Air power became the first line of defense and so could not be subordinated to any other branch of the military establishment.

The legislative battle for unification of the military services began in 1944. The original bills were unsatisfactory to one or more of the Services.

The Joint Chiefs of Staff reported early in April, 1945, that a majority favored a single military department. Later that year, the Eberstadt Report opposed the single department and recommended three new coordinated arms, each headed by a civilian of cabinet rank and all joined by the Joint Chiefs of Staff and a chain of committees. This report obviously was the Navy's conception of unification. Ferdinand Eberstadt, who headed the committee had been appointed to make the study by Mr. Forrestal, then Secretary of the Navy.

On the other hand, the War Department's plan called for the single department headed by a secretary of cabinet rank, a civilian undersecretary, and three or more civilian assistant secretaries.

The plan proposed a chief of staff as head of all three services, and a joint staff to coordinate military functions.

President Truman got into the act when the Services couldn't harmonize their basic differences. The President offered a seven-point program calling for the Army's single department and chief of staff. Yet, although the bill included many of the Eberstadt recommendations, it did not please the Navy and was never reported out of committee.

President Truman's second attempt to create order finally brought together Lieut. Gen. Lauris G. Norstad and Vice Adm. Forrest Sherman. They sat down to work out a bill acceptable to everyone.

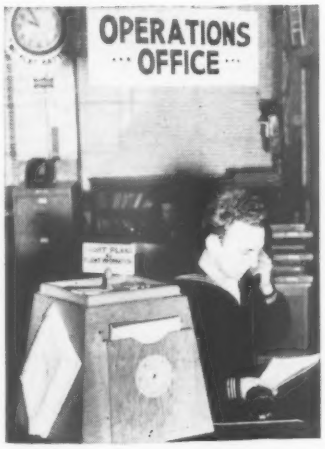
Compromise obviously was necessary and it was truly radical in the bill signed by President Truman in July, 1947.

The National Security Act of 1947 was designed to please everybody. The Air Force achieved independence. The Navy kept its Marine Corps. The Army was left alone fairly much except that it lost its air arm.

But, like many compromises, it had its limitations. They are chiefly those caused by lack of an administrative setup.

The Act provides for a single department (of Defense) under a civilian secretary (Mr. Forrestal) and Secretaries of Army (Kenneth C. Royall), Navy (John L. Sullivan) and Air Force (W. Stuart Symington). None of these latter three has cabinet rank. There also are the Joint Chiefs of Staff, National Security Council, National Security Resources Board, Central Intelligence Agency, and a War Council.

As soon as the bill was enacted, the jockeying for money, power and prestige began. Agreement was reached on the minimum military establishment for peacetime.



DATA DISPENSER

A REVOLVING "serve yourself" Flight Plan Dispenser used at Naval Air Station, St. Louis, contains four compartments with pilot information. Sides, from left to right, hold (1) U. S. Air Force Radio Facility Charts, (2) flight plan forms with a computer mounted outside, (3) CAA Flight Information Manual, and (4) Airman's Guide. Constructed of plywood, the box was developed by Lieut. (jg) Henry M. Poole, Lambert Field operations officer.

The Air Force was to have 401,000 men and 70 groups, plus 60,000 men in the National Guard and 20,000 in the Organized Reserve.

The Army was to have 837,000 men, 12 divisions, and 650,000 in the National Guard.

The Navy was to have 556,000 men and 390 combat ships, including 16 carriers and 32 air groups.

The Marines were to have 108,000 men and 40,000 in the Reserve Force.

The whole program called for an outlay of more than $9,000,000,000 which President Truman promptly whacked down to $3,000,000,000. Something had to give, and the three separate services began to work on Congress to show how much each should get out of the budget for themselves.

When Secretary of Air Symington appeared before the Congressional Committee, he stressed the dominant role of air power and by implication assumed for his branch of the service the sole responsibility of the country's military security. He asked for 70 air groups, a request which precipitated an immediate rebuttal from Secretary Forrestal.

The conflicting testimony before the committee made spicy newspaper reading, and reopened many questions concerning the workings of the unification act.

Then came the super-carrier affair. The proposed carrier would measure 1,090 feet overall. It would have a maximum beam of 190 feet (236 feet with outboard elevators extended) and would cost $124,000,000 and gross 65,000 tons. Its size and flush deck construction would permit the operation of bombers with a range of 1,700 miles.

Then the Air Force jumped into the discussion. The planes proposed by the Navy would encroach on the Air Force's assignment of missions and overlap Air Force functions. The proposed carrier had the support of the President, Secretary Forrestal, and the Budget Bureau's Planning Group.

Adm. Louis Denfeld, Chief of Naval Operations, told the House Armed Services Committee that the Joint Chiefs of Staff had approved the plans for the carrier. General Carl Spaatz, the Air Force Chief of Staff, denied that he or his staff had approved it. The resultant row so stirred Congress that it now intends to investigate the matter thoroughly.

It is possible that Admiral Denfeld could have made an honest mistake, but General Spaatz's supplementary document stating that he merely endorsed the Navy's plane program, not the carrier, incensed some Navy brass. They charged that Air Force officers are telling individual Congressmen that the carrier is a mistake and a waste of money.

Charges of "dirty fighting" and "violation of rules" were made—all hardly conducive to closer relationship between the services.

Meanwhile, professional Army men have not taken the reorganization lying down. They fear the ground army has been relegated to a mere supporting role to the Air Force. And they are determined to force a reconsideration of present-day military concepts which assume that the use of the air arm can be decisive without the need to use extensive land forces.

Yet, unification of the armed services is a "must" for any modern power. If the existing act is weak, inefficient, or incomplete, a new bill obviously is in order. Everyone, from Secretary Forrestal on down, agrees to that. Reports are even circulating that Mr. Forrestal's staff has begun to study possible amendments to the Act.

It is possible, however, that Congress will act despite Forrestal's efforts. There is much disturbance over the fact that unless a serious effort is made to strengthen the law some high ranking officers in all three services will step out.

Washington is convinced that harmony cannot be achieved under the present Act. Washington also is convinced that a unification act is absolutely necessary. Such an act must contain teeth and the necessary provisions to give this country the sort of defense setup it has to have to meet any international situation. END

Track Error Navigation

(Continued from page 21)

later, then he should be back on his original true course at 9:36 a.m. The pilot must alter course once again in order to stay on his original true course, so he alters course to the right by the original track error of 7°, or to a magnetic heading of 88° and continues on to his destination. The pilot's log should look something like this for the trip:

TIME	MAG. HEAD.	OBSERVATION
9:00	95	BASE, set course DESTINA-
		TION
9:18	81	Fix position over Center-
		ville. Track error
		7° to right. Alter course by
		14° to left.
9:36	88	On track. Alter course by
		7° to
		right. Continuing to DES-
		TINATION.

Now for the second choice of solution: As previously stated this second type of problem is especially useful when the aircraft has gone more than half way at the time of the off-course fix. The pilot's original magnetic heading from base is 95°, and he fixes his position off course over Centerville 25 minutes after leaving base. By visual inspection he sees his track error is 5° to the left. He wishes to make one alteration of heading that will take him directly to his destination. In this case he must alter course to the right by more than 10°. How much more depends on the track error angle at destination.

In the drawing, he can see that the angle at destination is 10°. The next step is to add the two track errors together, $5 + 10 = 15$. This is the total correction, of course, so he alters course to a magnetic heading of 110° and continues straight to his destination. The log would look like this:

TIME	MAG. HEAD.	OBSERVATION
9:00	95	BASE, set course DESTINA-
		TION
9:25	110	Fix position over Center-
		ville. Track error
		at BASE 5°; 10° at DES-
		TINATION.
		Alter course by 15° to
		right and
		continue to DESTINATION.

There is one discrepancy in the explanation which, at first glance, might seem to upset the calculations. Whenever the heading of the aircraft is changed, the wind

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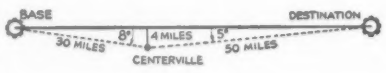
strikes the aircraft at a different angle than previously; consequently the drift will not always be exactly as estimated. This error is so slight, however, that it can be dispensed with in actual practice.

In relation to the second problem just discussed, there is another solution that may be more practical under certain conditions. It involves expressing the track error as "miles off track" rather than degrees. As an example, let's use the case of the pilot at the beginning of the article. He finds he has traveled 30 miles from base and is over Centerville, four miles to the right of his intended track. He has an additional 50 miles to go. Since no 5° lines have been drawn on the map previous to his take-off, he must calculate the track error by some sort of proportional formula.



For the solution the pilot needs some standard known fact, some "rule of thumb" on which to base his calculations. Let's use the "one mile in 60" rule as a standard which states that if the aircraft is one mile off track at the end of a 60-mile run, the track error at base will be 1°.

Keeping this in mind the pilot can find the track error at base by the formula $X \times 30$ miles $= 4$ miles $\times 60$, with "X" the unknown angle of track error at base. Solving for X the pilot gets 8°. By the same process he finds the track error at destination. $X \times 50$ miles $= 4$ miles $\times 60$. X equals almost 5°. Then by adding the 8° and 5°, the pilot alters course to the left by 13° and continues straight to his destination. With the aid of a computer slide rule, the solution is reduced to a few quick mechanical operations.

Many pilots ignore the forecast wind altogether when setting course and simply steer a "magnetic course," choosing to make a track error correction at the first check point that will automatically take care of the wind correction angle. There is no substitute for thorough preparation before flight, however, and a careful choice of check points along the route plus the intelligent use of 5° lines will eliminate many causes of faulty navigation. END

Black Hills of S. Dakota

(Continued from page 35)

late in July at Spearfish, S. D., will be held at the Black Hills Airport, four miles west of the city. The annual show attracts plane racers and aerobatic flyers and lasts two days. Don McFall, manager of the airport, says a restaurant will soon be available on the field. He recommends the Spearfish Hotel, which has rates beginning at $1.50 per person. Also at Spearfish are nine tourist courts and one other hotel.

Located on the northern edge of South Dakota's Black Hills, Spearfish has a city park with facilities for trailer vacationists, outdoor campers and picnickers.

Spearfish is the home of the Black Hills Passion Play, which originated in Luenen, Westphalia, in 1242. Performances are given every Sunday, Tuesday and Thursday at 8 p.m. General admission is $1.50 and boxes are $2. Final performance of the season is September 5, 1948.

Sixteen miles southeast of Spearfish is Deadwood, S. D., the small town (population 4,100) whose name symbolizes the old west. Five hotels and 10 tourist parks are located in the city, with rates beginning at $1 per person. In Deadwood, you can see a number of local points of interest without charge. Among them are:

Adams Memorial Museum—contains mementos of early Deadwood days, including Wild Bill Hickok's marriage certificate and raw gold nuggets found in the vicinity.

Wild Bill Hickok's grave—Located in Mount Moriah Cemetery, one mile from town. Also in the cemetery are the graves of "Calamity Jane" and "Preacher Smith" (Henry Weston Smith), who was killed in 1876 by Indians.

Deadwood Dick's cabin and grave—located two miles north of Deadwood.

Site of Saloon No. 10—spot where Wild Bill Hickok was murdered by Jack McCall.

Three miles from Deadwood, at Lead, is the Homestake Gold Mine, a giant operation which has produced gold for over 70 years. Homestake is the largest gold mine in the U. S.

Fishing season in the Black Hills opens May 1 and closes September 30. Non-resident fishing license costs $3 and visitors' five-day courtesy licenses sell for $1.

Nights in the vicinity are cool (the average temperature for the summer months is about 66°).

Outstanding event of Deadwood's summer season is the three day celebration called "Days of '76" which is held in August. During those days the old western town holds parades, rodeos, pageants and plays in an attempt to recapture the spirit of times when it was one of the roughest, "widest-open" towns in the country.

Though in some ways Deadwood has lost its rough-hewn charm and has become commercialized, the rugged chant of its barkers is not diminished. The Chamber of Commerce says the visitor will have a full quota of fun from dawn until "the late hours when the last light blinks out at the various gambling halls and saloons. . . ."

Also at Deadwood, the flying visitor can hire taxis which will make a 150-mile sightseeing tour through the Hills for $30.

If you're based at the Black Hills Airport while visiting Deadwood, Spearfish and the vicinity, you'll want to take a hop up to Newell, S. D., where C. W. Fiegen runs a "Main-Street Airport." If you'd like to spend the night at Newell, Fiegen recommends the Newell Hotel (half-block from the airport) where rates begin at $1.50 per night.

Twenty-eight air miles west of the Newell strip is Belle Fourche Airport, 1½ miles from the city. The city is the site of an annual Black Hills Roundup, which was held this year on July 3-5.

Rapid City, considered the eastern gateway to the Black Hills, is well supplied with airports—Superior, Halley and Rushmore all being within five miles of the city.

R. O. (Sandy) Sanderson, manager of Superior Airways, says he will attempt to arrange hotel reservations and furnish transportation to hotels for FLYING tourists. "The most prominent sight in the Black Hills," says Sanderson, "is the Rushmore Memorial, which is commonly known as the shrine of Democracy. It is 20 air miles from the airport and the flight is scenic. We're proud of the Black Hills, and assure all travelers that we'll cooperate in making their vacation a success." Superior is a new airport and was formerly known as Geronimo Airport. Hangar fee is $1.50; tiedown is free.

Halley Airport at Rapid City is adjacent to the city limits. Forty-seven planes are based on the field, which is headquarters for Beechcraft, Piper, Aeronca, Swift, Taylorcraft, Stinson and Cessna dealers in the area.

Rushmore Airport is five miles east of the city.

Theodore Roosevelt and Abraham Lincoln, is located in Custer State Park near Keystone, S. D. If you prefer not to fly over the monument, you can take sightseeing buses from Rapid City.

On the southern border of the Black Hills is Hot Springs, which has an excellent municipal airport with three runways, the longest 5,000 feet. Stanley A. Manchester, manager of Manchester Airways at the field, offers to secure reservations for trips through the Black Hills via the Black Hills Scenic Service. He flies aerial sightseeing trips over the Black Hills and the Badlands, which are only 30 air miles distant. Manchester promises to "make every effort to see that the FLYING tourist receives the best of accommodations while in Hot Springs."

A short hop from Hot Springs is Edgemont (20 air miles), where Guy H. Stickney or Clayton Feldhausen, managers of the airport, will secure hotel reservations and

SOME AIRPORTS SERVING THE BLACK HILLS

Airport (longitude and latitude)	Phone Number	Nearest town and distance	Number of Runways	Length of Longest Runway	Gasoline Grades	Service Facilities	Write to:
Edgemont (43°18'-103°50')	4791	Edgemont, S. D. 1 mi.	Four	3,700 ft.	80 oct.	Major repairs	Guy H. Stickney, or Clayton Feldhausen, Managers, Edgemont Airport, Edgemont, S. D.
Hot Springs (Municipal) (43°22'-103°25')	16F3	Hot Springs, S. D. 5½ mi.	Three	5,000 ft.	80-91 oct.	Major repairs	Stanley A. Manchester, Manager, Manchester Airways, Hot Springs Airport, Hot Springs, S. D.
Superior (44°6'-103°10')	2320	Rapid City, S. D. 1½ mi.	Two	3,400 ft.	80-91 oct.	Major and minor repairs	R. O. Sanderson, Manager, Superior Airways, Superior Airport, Rapid City, S. D.
Halley (44°05'-103°12')		Rapid City, S. D. 1½ mi.	Three	4,000 ft.	73-81 oct.	Major repairs; DAMI	H. C. Marshall, Halley Airport, Rapid City, S. D.
Rushmore (44°07'-103°9')		Rapid City, S. D. 5 mi.	Three	3,100 ft.	73-91 oct.	Major repairs	Ralph Letellier, Rushmore Flying Service, Rushmore Airport, Rapid City, S. D.
Black Hills (44°29'-103°46')	73M and 73R	Spearfish, S. D. 4 mi.	Eight	5,500 ft.	80-91 oct.	Major minor repairs	Don J. McFall, Manager, Black Hills Airport, Spearfish, S. D.
Newell (Municipal) (44°44'-103°25')	4421	Newell, S. D. (Airport located on Main Street)	One	3,000 ft.	80 oct.	Minor repairs	Manager, Newell Airport, Newell, S. D.
Belle Fourche (44°46'-103°59')		Belle Fourche, S. D. 1½ mi.	Two	3,000 ft.	80 oct.		Edwin Busfield, Belle Fourche Airport, Belle Fourche, S. D.

Rapid City has three hotels and 55 tourist and cabin camps, with a total of 500 cabins. Probably first among attractions in the city itself are Skyline Drive and Dinosaur Park. The park includes reproductions of prehistoric animals in their natural size. These creatures roamed the Black Hills country some 100,000,000 years ago. Actual petrified or fossilized bones can be seen at the South Dakota School of Mines Museum at the east edge of Rapid City on Highway 79.

The Federal Sioux Indian Museum, west of the business district, contains a comprehensive display of Indian apparel, implements of war and pictures.

Canyon Lake, 3½ miles west of Rapid City, is fed by mountain spring water and affords excellent fresh water swimming, beaches, boating, hiking and sightseeing. Riding horses can be rented there.

The Mount Rushmore National Memorial, which contains colossal sculptures of George Washington, Thomas Jefferson,

arrange trip schedules for FLYING tourists. They offer to conduct pilots personally to some of the best fishing in the Hills. The Oxnard Hotel, which has rates beginning at $1 per night, is the recommended in-town hotel; and transportation into town (one mile) is furnished by the airport.

Using any of these airports as base, or making a tour of all of them, the FLYING vacationist can reach almost all parts of the Black Hills.

Once in the area, experienced local pilots can give advice for additional trips and excursions to points of interest. The entire region is studded with monuments, National and State parks and forests, out-of-the-way lodges, and fishing streams. Hunting is not a top summer attraction but information on the fall and winter season can be obtained from natives, who have the Western desire to help strangers and see that their home state is shown to good advantage.

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I Learned About . . .

(Continued from page 44)

power almost completely off before the engine slowed down! I formed the rather belated conclusion that the engine was not putting out much power and kicked myself mentally for trying to ride the plane in. I concentrated on holding the best possible airspeed and the nearest heading toward the runway. The altitude was decreasing rapidly and I could not see the field. I was straining to see through the smoke at one side of the cockpit when the voice of the auxiliary control tower operator crackled in my earphones.

"P-40 in trouble, you have the runway . . . the field is clear."

I thought to myself that a clear runway would do me no good if I could not get to it. I automatically dropped the nose another degree as I saw the airspeed get a little closer to the stalling point. Perspiration dropped from my forehead into my eyes. Hot oil seeped through the partially opened canopy I hadn't had time to close. I wiped my face with a grimy hand and strained to get a glimpse of the runway. Through the smoke I suddenly saw the high tension lines coming at me and I steeled myself for a crash. I cleared the wires by inches. Before I had time to feel relief the smoke parted for an instant and I looked into the looming structure of the auxiliary control tower.

I saw men running from the control tower. The tower operator was sitting frozen with the mike at his mouth. The headphones crackled but no voice came through. I kicked hard left rudder and snapped the stick to the left side of the cockpit. The plane responded sluggishly and started to fall out from under me as I recovered from the steep bank. I heard the operator's strained cry in the earphones.

"You're on the ground! Level off!"

I snatched the stick back into my stomach and felt the jar of a solid landing on the concrete. The plane swerved slightly and I kicked rudder to hold it straight. Then with a start I realized that I had made the approach at near stalling speed with the drag of the landing gear adding to the hazard of the landing. I could have pulled up the gear and made the field with altitude to spare! I reached up and snapped off the switches. I should have had them off before I touched the ground!

It was too late to get excited about the chances of an explosion. I had already tempted fate to the limit; I was on the ground by the time the P-40 stopped rolling.

The fire was easily extinguished and the trouble traced to the supercharger impeller shaft which had twisted in two, throwing the impeller gear through the engine into the crankcase before it stopped. Other planes developing similar trouble had been demolished when the pilots had bailed out and their planes had crashed. Now the trouble could be traced and the rest of the planes checked to avoid more accidents. I felt proud that I had brought mine down in one piece; nevertheless, errors in my flying technique and judgment could have made the story end quite differently. END

Single Seat Fighters

(Continued from page 32)

will be rapid-fire, spin-stabilized, proximity-fuzed rockets—but would you expect this interceptor, weighted down with an array of complicated radar, fire control equipment, armament and heavy ammunition to be operated by a single pilot? Every ounce of equipment is added today only with the greatest of reluctance, since the addition reduces both range and endurance of conventional-sized fighters.

It seems a logical deduction, therefore, that if range and endurance must be *increased*, rather than decreased, and more complex equipment must be added, the plane's size must also increase. Big planes can hardly be efficient single seaters. In the Navy, the trend toward large aircraft is evident when one considers that Congress was recently asked to authorize money for the construction of an 80,000-ton aircraft carrier—almost twice the size of the huge *Midway* class. It is apparent that a bigger carrier can accommodate bigger planes. And here again, the implication is that bigger planes won't be single seaters.

The inadequacy of eyesight at high altitudes and high airspeeds has already been mentioned. An additional physical limitation, which strengthens the case for multiplace interceptors, is pilot endurance. The pilot of the next decade flying in the stratosphere, encumbered with oxygen equipment, a pressurized and electrically heated suit, will find his physical efficiency taking a nose dive after a short time in the air, especially if the air is turbulent or the nature of the mission requires much maneuvering. What value is an expensive machine and complicated equipment if the operator is physically inefficient when using it? One idea behind the F-82 was that one pilot could spell the other during a long hop.

In addition to the practical and tactical problems which are demanding a multiplace pursuit plane, there is the consideration of money. It has become a great rarity for our smaller military planes to cost less than $100,000 each. On the other hand, it is not uncommon for a single plane to cost the Government many millions. The question arises, therefore, can we afford the luxury of buying thousands of planes capable of performing only one task when it is feasible to build multi-purpose airplanes?

Aviators have traditionally shuddered at the idea of multi-purpose airplanes. In the Navy, for example, a sour taste has prevailed for almost 20 years. Back in 1924, the Navy procured a multi-purpose plane, designed for the triple role of scouting, torpedo bombing and dive-bombing. It was a monoplane, powered by a 400-h.p. direct drive engine, rated at 2,100 r.p.m. and carried three people. Dubbed "Peanut on a Plank," it turned out to be a terrific lemon. Though the execution was poor the idea was not—as the many multi-purpose planes of the recent war proved. Twenty years ago, aeronautical science had simply not progressed far enough to permit such a plane. Even today, the idea of a multiplace plane is not entirely accepted. One type will replace two or even three types and accomplish each job as well as planes

specifically designed for an individual job. The financial saving, the simplification of logistics and training, are obviously considerable. It is not impracticable, therefore, to imagine a multi-place interceptor capable of destroying other planes, carrying bombs, equipped for radar, photography, night flight, long patrols, ASW, and other minor but nonetheless important duties.

To our aircraft industry, and to our air readiness program, this is a profound change which tactics, economics and common sense are making necessary. Until the day when guided missiles and pilotless aircraft are operational fact, we are probably seeing the last of the one-man military plane. END

(The opinions expressed in this article are those of the author, and are not to be construed as reflecting the views of the Navy Department or the Naval Service at large.)

The Tactics of Suicide

(Continued from page 20)

aircraft, the *Betty*. A later Japanese Navy version, the Oka-43, which was not operational during the war, was to have a range of 150 miles—and was to be jet instead of rocket propelled.

The Germans, too, experimented with the piloted suicide bomb. The FZG-76, which was actually a piloted V-1, was ready for use in 1945.

The Germans also tried ramming with conventional planes on April 7, 1945, using a special unit of volunteers. In one case, a Nazi Me-109 accounted for 20 Americans and two heavy bombers and the pilot is believed to have bailed out successfully before impact.

Even the Russians used the ramming technique during World War II. Typical example is that of Pilot Sergeant-Major Totmin, who was killed when he intentionally smashed head-on into a German plane.

But in the last war, except in the case of Hiroshima when the Japs were not aware of the implications of the attack, it was never necessary to eliminate virtually 100 per cent of attacking bombers. During World War II it was generally held that if even 10 per cent of enemy bombers were knocked down, the battle was won. It was considered that no air force could long keep operating if it lost 10 per cent of its planes on each raid.

Today the picture is changed. If 50 per cent of atomic bomb carriers could reach their targets, U. S. cities would be devastated. An enemy wouldn't have to fight very long if half its bombers could hit vital installations.

That's the reason we've heard talk of suicide pilots in the past few months.

Most tacticians, however, prefer to think of the suicide mission as a "last-ditch" measure. They talk in terms of a specially-built interceptor plane, possibly with a pressurized pilot-ejection capsule. The plane probably would have a war head and would be equipped with automatic radar tracking and possibly thermal, acoustic or photo-electric homing devices.

It would be possible to fly a "collision course" on which the plane would reach a point where, due to high speeds of modern aircraft, the enemy bomber would be unable to avoid hitting the interceptor. When the interceptor reached this point, the pilot could press his ejector button and parachute to earth.

Eventually, even this type of plane won't be needed. Guided missiles are being developed. They may one day be able to seek out attacking enemy bombers and destroy them automatically, without the need of a pilot. To date, however, such pilotless aircraft have not been tactically perfected despite reports to the contrary. They still can't be controlled over long distances.

Major Driscoll, who is an instructor in the New Developments Division, Air War College, believes the specially-designed air-rammer would constitute an effective supplement to conventional antiaircraft defenses. Even with continued technological advances in the creation of guided missiles, the specialized close-in fighter (built for ramming purposes) can be of tremendous interim importance. While the Japanese *Kamikaze* concept is not to our liking, we can probably devise ramming planes which will give the pilot a fair chance of survival. Those planes could be a deciding factor in an atomic war. END

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What's Right with the Airport Program?

(Continued from page 15)

ments in United States air transportation.

The Federal Aid Airport Act was the answer. Passed by the Congress in May, 1946, it authorized the expenditure of $500,000,000 for construction and development of airports over a seven-year period. Yearly appropriations could not exceed $100,000,000. Local expenditures would be matched by Federal money for the development of both large and small airports—well spaced across the country and providing the needed network of landing areas.

CAA's long-range aim is to provide this system of airports, thereby increasing the utility of all types of aircraft. The large airliners will have more schedules to a greater number of places, and lightplane pilots will not be restricted to flights around the home airport as has been the unfortunate situation in some areas.

What has been accomplished in the two years the Federal Airport Act has been in effect?

Despite all the criticism leveled at the Civil Aeronautics Administration, much progress has been made:

Over 330 grant offers amounting to approximately $35,000,000 in Federal funds have been made to local governments for construction or improvement of airports. Close to 30 other projects are being processed through the Washington offices, and even larger numbers of projects are getting District and Regional CAA approval. The last tabulation revealed 13 projects completed, 39 between 67 and 99 per cent completed, and 31 between 34 and 66 per cent completed.

More than 757 local government units have completed arrangements to participate in the construction and development program. Of these, approximately 611 have made field surveys, and 664 sponsors have funds 100 per cent available. Estimates for July were that over 150 local sponsors would be given the green light to proceed with construction. More than 182 contracts have been awarded.

Even greater progress is anticipated in months to come. Participating communities have had time to obtain funds, to get engineering plans and specifications drawn and presented, to receive approval of the master plan for the airport. Response to the Federal Aid Program by cities and towns has been tremendous. At the present time the CAA has requests for Federal aid in excess of 200 million dollars more than it can handle with the funds already appropriated.

To date the Congress has made three appropriations under the Federal Airport Act. The first was for $45,000,000 for fiscal 1947, the second for $32,500,000 for fiscal 1948, while $40,000,000 became available July 1 for fiscal year 1949.

Just as the 1947 and 1948 programs were combined into one as the funds for 1948 became available, the three programs were merged into one following receipt of the money for fiscal 1949. In general, funds tentatively allocated to local sponsors and not yet used have been carried over, and additional projects were added with the new funds.

Work in drawing up the 1949 program was completed in July. New projects included in the combined program for fiscal year 1949 are based, as in the past, strictly on the basis of aeronautical need in the community, as related to the need in the area and the entire country. Both large and small communities participate. We believe this is an important step in providing the nation with a well-balanced system of airports for civilian aviation—and for military use in times of emergency. END

The Mail Box

(Continued from page 6)

complete with SWI, and learns to fly it. But Great Scott! One day the little gimmick goes haywire! . . .

HARVEY MACE

Clarksburg, Calif.

● For another angle to the question, see below.—ED.

My plane co-owner, a former Army instructor with 3,000 hours, wanted to install a stall-warning indicator on our Swift 85. Inasmuch as I have only 200 hours, I used Jimmy Foreman's letter to the editor [May, FLYING], to support my stand against spending $47 for a Safe Flight Indicator. But my partner thought his experience was as good as Foreman's—and had the instrument installed.

Well, yesterday I was making my final right turn into the airport at Blairstown, N. J. (a right-hand pattern is used when the wind is westerly at Blairstown) and had checked the approach and base leg to make sure I was clear.

Suddenly I saw an Aeronca turning into me from a left-hand pattern! If the airplane hadn't been strapped to me, I'd have jumped through the canopy. I rammed the throttle against the wall, steepened my bank, and added back pressure. Then it happened! The Safe Flight Indicator sounded off and I immediately eased the back pressure.

Since our indicator is set for a 5 m.p.h. warning, I honestly don't know whether I would have stalled; but even if I hadn't, what about the next time, and the time after that?

Every plane I ever own is going to have that $47 worth of insurance riding on the instrument panel!

MARTIN L. NEWMARK

Brooklyn, N. Y.

FROM ENGLAND

. . . As a member of the National Aeronautic Association, the European Representative of the A.M.A., and a member of the Royal Aero Club of London, I want you to know how much I appreciate reading your excellent magazine.

. . . Although not on the subscription lists, I manage to obtain my copies here in London regularly on news stands—although I propose to subscribe when I am in the States later this summer. . . . FLYING always

presents in a personal manner (and without pulling any punches) matters of interest regarding all branches of the aircraft industry.

PERCY E. CHORLEY

London, England

AIRPORT WIDOWS

. . . No one knows better the problems of wives than I do. You see, I work at a small airport—keep books, scrub classroom floors, make change for cokes, cigarettes, shovel coal, brew coffee, hold wrenches, gas airplanes. And I love it!

[My advice to wives of pilots:]

When you are at the airport, don't honk the car horn. Don't keep nagging about the time (he'll make it longer just to be obstinate). Take the kiddies to the airport. . . . You can relax by knitting, mending or reading.

MISS JERRY KNAUSS
Larsen Flying Service

Beaverton, Mich.

After reading "My Husband's a Pilot—the Jerk" (April, FLYING*):*

There are many species of widows—
Black widows, grass widows, and such;
But there is one kind of widow
You don't hear about so much.

I refer to the Airport Widow,
She's a little-known variety;
She's an airport operator's wife,
Unsung Heroine of Society.

There are only two solutions
To the Airport Widow's plight:
She could find a handsome gigolo
To take her out each night.

Or she could get disguised as an airplane
With tricky camouflage—
Hubby might pay more attention
If she had wings and a fuselage!

The Airport Widow is happy, though,
And her husband can do no wrong.
Maybe some day he'll notice her!
(Ha! She should live so long!)

MRS. ALBERT SNYDER, JR.

Collingswood, N. J.

PRODUCTION-WISE

Mr. William B. Stout's article ["Can We Have a Universal Vehicle?" FLYING, June] is interesting—and true. I particularly agree when he says, "There is much wrong with [aviation] if we leave it as it is"—and when he comments that airplanes give "very small value for the money except that they fly."

According to your own figures, 30,000 planes were manufactured in 1946 and 16,000 last year. Some progress! I suppose the fault lies with labor and materials?

Mr. Stout's article strengthens my idea that flying is for the birds.

P. J. WAINFORD

Titusville, N. J.

● A top-notch aeronautical engineer, William Stout is one of aviation's biggest boosters. But he's not wearing blinders and he recognizes faults and sees need for improvement.

Contrary to the impression given by comparing 1946 production (which was abnormally high because of pent-up wartime demands) with 1947 (which showed a natural reduction, once the stored-up wartime demands were met), the U. S. aircraft industry has made tremendous strides in number of civil planes produced. In 1938, the last normal year before the beginning of World War II, only 2,698 personal planes were produced. In 1947, over 16,000 private planes were produced. In nine years, the annual production jumped almost 500 per cent.—ED.

HOW MANY STACKS?

. . . Does some new version of the Continental 125 engine have only two exhaust stacks per side (like the 85)? The Swift 125 on your May cover shows only two.

DON CORNWELL

Fort Lauderdale, Fla.

● The Swift 125 on FLYING's May cover is an experimental airplane with test mufflers on it. When and if approved, the mufflers will be sold as accessories and not as standard equipment.—ED.

DEFINITION

. . . I am puzzled by photographs in FLYING which show a letter after the plane registration numerals, in additional to the usual prefix. For example, George E. Anderson's Cessna 120 has the registration NC2686K. What does the "K" stand for?

ROY F. BULLERS

London, England

● The final letter has no special significance; it is used solely to reduce the length of the designation, which otherwise might reach as many as six digits in the near future.—ED.

WHAT'S THE RIGHT HAND DOING?

I quote from a letter received from Wright Field:

"The Equipment Laboratory has made numerous tests and conducted some research on [stall-warning indicators] . . . the Equipment Laboratory considers that there is no need to use a stall-warning device on military aircraft now, nor in the foreseeable future."

HAL J. BASHAM

. . . the Safe Flight Indicator has been installed on several types of military aircraft. In fact, one is being installed on a jet fighter plane today. The Luscombe liaison airplane had a Safe Flight Indicator . . . which the Army said they liked very much. Tests are being run at Wright Field at this time on an installation on a Stinson L-5. . . .

L. M. GREENE, President
Safe Flight Instrument Corp.

White Plains, N. Y.

FIRST WING WITH A SLANT?

I read with much interest Fred Hamlin's article "Wing with a Slant" (March issue).

There was a similar experiment conducted in the 1930s by, I believe, the Timm brothers with a low wing cabin ship equipped with adjustable hydraulic wing struts.

I saw this ship at the Los Angeles Municipal Airport in 1938.

LEO A. BRUMM

Savannah, Ga.

● Does anyone know about this plane?—ED.

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AIRPLANES FOR SALE

AERONCA

AERONCA Chief 1946, 45 hours since major, $1,275. Fred Stanton, 862 North Grand, Mesa, Arizona

AERONCA Chief late '46, radio 140 hours total time, $1150. Lee Braxton, Whiteville, N.C.

AERONCA Chief, 1946, 380 hours, engine perfect. Just rejuvenated and repainted, $1175. Write Box 294, Corinth, Miss.

CHAMPION, sensitive altimeter, rate of climb, turn and bank, Elgin clock, accelerometer; cockpit, position and landing lights, generator, new battery and tires, Scott steer-swivel tail wheel, Mufflers. Always hangared, very clean, recent 100 hr. $1395. Jerry Hoffer, Camden, S.C.

1946 AERONCA Chief, 460 hrs. total. Sell for cash, trade for Pick-up or late model automobile. L.S. Wade, Lower Falls Beach, St. Albans, W. Va.

AERONCA: Exceptional late 1947 Super Chief #4083E 85 HP. Continental engine. Airplane like new. Flown only 50 hours. Just relicensed. Always hangared. Original owner asking $1950. No trades. Write Powers & George, 475 Fifth Ave., New York, N.Y.

AERONCA Trainer NC 83151, total time 560 hrs.never cracked, always hangared. $1150. Resort Flying Service, Narrowsburg, N. Y.

AERONCA Trainer NC 85345, total time 475 hrs.good condition, never cracked, $1200. Resort Flying Service, Narrowsburg, N. Y.

AERONCA Trainer NC 3750E, total time 170 hrs. excellent condition, never cracked, $1550. Resort Flying Service, Narrowsburg, N. Y.

AERONCA Champion, 1946, 140 hours, good condition, hangared, $1300. Lynn D Timmerman, Box 916, Lima, Ohio.

BEECH

BEECH-CRAFT Bonanza, Model 35. Total hours 135. Always hangared. All bulletins complied with. All gyro-instruments. Better than new plane. Really just broken in. Write to P. O. Box 887, Tulsa 1, Oklahoma for all details and price.

DELUX two door, five place stagger beechcraft; 450 Pratt Whitney; 1500 mile range; 200 gal. gas capacity; leather upholstered; never damaged excellent care private mechanic; two-way radio; day-nite instrument flying; reasonably price. Charles Marshall, 354 Taylor Street, San Francisco, Calif. Prospect 5-6727.

BEECH Bonanza, perfect condition, like new, only 165 hours, will sacrifice. Write for particulars. Don White P.O. Box 1766, Denver 1, Colo.

BEECHCRAFT Bonanza, Blue trim, less than 100 hrs. Excellent condition. First $7500 Takes it.All bulletins complied with. Have purchased a Model "18" Russell Center & Co., San Antonio, Texas, P.O. Box 1521

BEECHCRAFT E17B-285 Jacobs, 5 pass., 10:30 since major & complete re-cover & rebuilt both A&E. Licensed day & night inst. cruises 165-170 on 13 gal/hr range 900 miles. Perfect in every respect, insurance indluded. Always hangared, looks & flys like new. $5,950. D.C. Johnson, 1173 Desplaines, Des Plaines, Illinois. Phone 1023-M.

BEECH: Four, recently overhauled, twin engine, low time, completely equipped executive transport airplanes with deLuxe interiors. A selection of models at reasonable asking prices. For complete descriptions write Powers & George, 475 Fifth Ave., New York, N.W.

BEECH: Bonanza #3133V with 180 hours total time. Relicensed in March ship is very clean, completely equipped, and in excellent condition. Asking $7250. Make offer. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

BEECHCRAFT D-17-S, Standard Equipment, fabric good, 800 hours since major overhaul, 1400 hours on aircraft. Box 589, c/o Flying.

BELLANCA

BELLANCA: Cruisair #87751 in new condition. Clean, with 75 hours total time. Relicensed April. Has radio, ADF, primary blind instruments, and Aeromatic propeller. Asking $3900. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N.Y.

1947 BELLANCA Cruisair, completely equipped. Aero-Matic prop, 2-way radio. Less than 150 hours, just relicensed. Excellent condition. $4000 cash. Box 590, c/o Flying.

CESSNA

TWIN Ceasna UC-78; Total time since new only 560 hours. Manufactured 1944. Deluxe job throughout. Hand-rubbed dark green finish with cream trim. Cabin Fiberglas soundproofed and upholstered in two-tone tan and brown, all like new. Floor raised, battery under co-pilot's seat, radio in nose, etc. Outside baggage door, extra 30 gal. tank, heavy wing, constant speed props. Always hangared, never damaged in any way. Privately owned and flown, and maintained in absolutely top condition. Really must be seen to be appreciated. Licensed, day, night and instrument. First cash offer over $3500, or will consider light, side by side plane, plus cash, intrade. L. W. Rittenhouse, Honeoye Falls,N.Y.

CESSNA: 140 #90330. Flown 92 hours and in new condition with primary blind instruments, two-way G.E. radio, and retractible landing light. Asking $2000. Offers considered, no trades. Apply Powers & George, 475 Fifth Avenue, New York, N.Y.

1947 CESSNA 140. Total time sixty hours. Always hangared, never damaged. Price $2800. Barbara Scofield, Poplar Bluff, Missouri.

CESSNA: 195, #4436N. Five place, 165 MPH cruising, Cost $14,875 in December with special radio equipment, etc. Total time 125 hours. Asking $11,500. Make offer. No trades. Apply Powers & George, 475 Fifth Ave., New York, N.Y.

CESSNA-140: 56 hours total time, new Dec '46, privately owned, always hangared, has GE 2 way Radio, Dome Speaker, Airboy Standby Receiver, Blind Flight Group, Safe Flight Indicator, ship like new, $2400. H.W. Fuller, Far Hills, N.J.

DOUGLAS: DC-3 #7502. One of the few low time ships available. 1650 hours total on airframe. Under 100 hours on engines. Complete airline equipment and interior. Asking $29,000. Apply Powers & George, 475 Fifth Ave., New York, N,Y.

CESSNA for sale. NC 75 905; perfect condition; heavy wing; twin engine; five place, deluxe upholstered interior, outside baggage door, engines total time 601:25 hours, aircraft total time since reconditioned 147.25 hours Hamilton constant speed propellers, complete set of Blind flying instruments, Beacon receiver and automatic direction finder. Used exclusively for business, no longer needed. Phone, wire or write Great Central Insurance Co., Peoria, Ill.

CESSNA AT 17A Silver, Red enamel trim, black pin stripping. Cream and red plastic upholstering. Licensed for 5 people. Work on plane finished in May. Must sell immediately. Have $2500 time and money invested. Want to sell. Open for offers. Write to Nelson G. Thomas, 327 Douglas St., Salt Lake City, Utah.

TWIN Engine Cessna heavy wing. All accessories, including new radio compass, new leather upholstery, new tires and steel props, Total hrs. since new 825. Licensed. Privately owned. Write R.R.2 Box 305, K&K Washed Sand & Gravel Plant, South Bend, Indiana

1947 "140" INSTRUMENTS, transceiver, auxiliary seat, new type gear, pants, Met-L-Prop, 75 hrs., hangared $2925. Galaida, 1067 Rahway Ave., Avenel, N.J

CULVER

CULVER V 119 hours. Licensed to Sept. $1695 or trade. K. Van Ausdal, 303 S. 23, Richmond, Ind.

1941 CULVER. 80 Franklin. 494:50 total 144:20 since major. Two-way radio. Excellent condition. Cruise 125 on 8 GPH. Unequaled for economical X-C. $1600. John Fickler, Coudersport, Pa.

ERCOUPE

1946 ERCOUPE 150 hrs. Starter, Lights, Extras. Licensed. Best offer takes it. Box 303, Marshfield, Wis.

MOVING to Alaska. Must sell new '47 Ercoupe with only three hours ferry. Will deliver from East coast for expenses. Box 591, c/o Flying.

ERCOUPE,415C, late 1946, total time 190 hours,sensitive altimeter, Bendix receiver and transmitter, loudspeaker, headset, the best microphone, loop, Sperry Altitute Gyro, Outside air temp. navigation lights, starter, generator, new type nose spinner, flies very well and in very fine condition. Fabric is hand finished. $2100. Cloyes Gear Works, Inc., 17214 Roseland Road, Cleveland 12, Ohio.

ERCOUPE, 1946, beautiful, like new, always hangared, 33 hours original,owner, will sell or trade for new car. R. A. Schacht, 1585 Forest View Drive, Kirkwood 22, Mo.

ERCOUPE 70 hours, in excellent condition, 2 way radio, sensitive altimeter, direction finder, heater, starter, metal propeller, quick drain gascolator, cruises 115. 5 gallons per hour cost new, $4100 sell for $2500. Bought larger plane. Dr. W.J. Ryer, Hawthorne, N. Y. Pleasantville 898 Days.

FAIRCHILD

PT-26 79:15 Since major, recent new propeller and all fabric, full blind instruments both cockpits, complete hatch. New license. $1250. Jerry Hoffer, Camden, S.C.

FAIRCHILD 24R, 1946 model, 4 place, General Electric radio, landing lights, flares never cracked, always hangared, 450 hours total, 100 hours since overhaul. Cost $8800 a little over a year ago. Our price $3495. Fly boys and girls here's a buy. Vest Aircraft Co., 4600 Dahlia, Denver, Colo.

FAIRCHILD 24W 165 h.p. red with cream trim, licensed day, night and instrument including Grimes landing light, fluorescent and moon-glo, Bendix two way radio, sixty gallon tanks. $3500. C.M. Hayes, Hulman Field, Terre Haute, Ind.

1946 FAIRCHILD 24 Warner Airplane, 4 place, equipped with Motorola Radio, loop, etc. $4700. Resort Flying Service, Narrowsburg, N.Y.

FAIRCHILD 24 175 h.p. Ranger Built 1946 four place. Less than 100 hr. total time on aircraft, relicensed. Hand rubbed finish. Blind flight group. Seat covers clock G.E. radio receiver and transmitter, with pants and fenders. New propeller with large hub and large prop. An exceptional buy $6,595. Kenneth Johnson, Callender, Iowa.

GLOBE

GLOBE: Swift 125 #81665 with only 85 hours total time Aeromatic propeller, and G.E. two-way radio. Excellent clean condition in Pennsylvania. Asking $2750. Make offer. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

GRUMMAN

LICENSED J2F-6 day and night. 50 hrs. on new engine. $4000. Lee Bowman, 1690 Skyline Dr., Lemon Grove, Calif.

GRUMMAN: Widgeon model 44, #9312H. Built 1943. Total time 378 hours, 88 since conversion. Just checked and relicensed. Finest condition throughout. Asking $10,500. Want offer. No trades. Apply Powers & George, 475 Fifth Ave., New York, N.Y.

GRUMMAN: Mallard #3049 with 250 hours total use. 10 passengers, 2 crew, Relicensed and all bulletins executed in May. Top condition. Duplication cost over $135,000. Asking $100,000. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

GRUMMAN Widgeon. 1030 hours. 110 hours on new engines. No time since relicensing. Hangared. Included spare engines 399 and 411 hours since major. Ted Blaisdell, 1052 Grove St., Framingham, Mass.

HOWARD

HOWARD 15-P-4 place, 91 hours on new engine, 104 hours since major, recover, licensed to April 21st, 1949, night, day, instruments, $4,000. Will take good AT 6 in trade. E. B. Jeffress, Ashville, N. Y R.D.#1.

LUSCOMBE

LUSCOMBE: 8E, #2395K. Late 1947 metal wing,with 130 hours total time. One owner. Always hangared. Just relicensed. Blind instruments, radio, special soundproofing. Asking $2900. want offer. Write Powers & George, 475 Fifth Ave., New York, N.Y.

WILL trade for new Chevrolet or Plymouth sedan my 1946 Luscombe Silverair, total 40 hours, hangared, never damaged. T.R. Lamb, 861 Granby St., Norfolk, Va.

NORTH AMERICAN

P51-A FIGHTER, Dive Bomber Engine 76 since new $5500. G. Hadsell, 435 N. Croft Ave., Los Angeles, Calif.

NORTH American Navion, purchased new May 1947. Total hours 120. Like new, excellent condition. $5500. Resort Flying Service, Narrowsburg, N.Y.

NORTH American Navion, 200 hours, fully equipped, perfect condition, all bulletins complied. $6000. Irving Horwitz, 9 Ureco Terrace, Worcester, Mass.

NORTH AMERICAN: Navions. 4 excellent 1946-47 airplanes available from $5200 up, depending on total time and equipment. Owners want offers. No trades. For complete details and inspections apply Powers & George, 475 Fifth Avenue, New York, N. Y.

PIPER

LIKE new 47 Super Cruiser, less than 200 hours by private owner. Landing light, radio. Can finance, $2485. Charles Hayes, Hulman Airport, Terre Haute, Ind.

SUPER Cruiser, 47, total time 93 hrs., all bulletins complied with, 100 hr. check and relicensed. Two way radio, always hangared, never cracked, like new. Sacrifice, $2800. Charles J. Wendel, 3325 Buffalo Road, Wesleyville, Pa. Phone Erie, Pa, 86-210.

PIPER J3C, NC 51541, 65 Continental, hydraulic brakes, good fabric, being relicensed. $900. Owner John Stively, Liberty Grove, Md. Hangared at Lovett Airport, Elkton, Md.

PIPER Coupe J-4-A, 65HP 1940. Just majored. Just licensed. 778 hrs. total time. $850. A.S. Bailey, Urschel Field, Valparaiso, Ind.

May, 1947, 100 HP Super Cruiser Seaplane, Edo #2000 Floats. Under 250 hours. Newly reconditioned and corrosion proofed; specially reinforced Longeron assembly. Relicensed May, 1948. Instruments include Hallicrafter two way radio and stall warning. Aeromatic prop. Land Gear included. Ship in top condition. Priced low at $4450. Owner has larger ship. Bowles Agawam Airport, Agawam, Mass.

1947 CRUISER: Starter, 2 band radio, heater, sensitive altimeter. One owner, always hangared. 90 hrs. total $2800. Benton L. Gaulden, Pacomoke City, Md. Route #2.

PORTERFIELD

PORTERFIELD LP-65, Just re-licensed, new fabric. Perfect condition. $499. Ellis M. Huston, Windsor, Mo.

PORTERFIELD, 35-70, licensed, low time and in perfect condition. Hilton Airport, Hilton, N.Y.

PORTERFIELD LP-65. Just relicensed, new fabric. Perfect condition. $599. Ellis M. Huston, Windsor, Mo.

REPUBLIC

REPUBLIC: Seabee #6266. An exceptional 1947 airplane with 91 hours total time. Relicensed in April, ship is in new condition with many extras. Asking $3500. No trades. Apply Powers & George, 475 Fifth Ave., New York,N.Y.

SEABEE: Late model, serial no. 711, NC646OK, only 90 hours total time, always hangared, excellent condition. Make offer. Harold Tracy, Brown Ave., Norwich, N. Y.

SEABEE: 85 hours, like new, fully equipped, Radio. 2 fans, steerable tail wheel, set of covers. Never in salt water. Serial 716 $5500. Petroff Slaby, 805 N. 28th St., Milwaukee, Wis.

REPUBLIC Seabee RC-3, manufactured 5/47. Steerable wheel, Hartzell reversible, always hangared, 130 hrs. total, never scratched, condition perfect, $4500. Box 595, c/o Flying.

SEABEE 100 hours, relicensed June, reversible propeller, two way radio, cross country panel, never in salt water, $4,000. Box 491, Nashville, Tenn.

STINSON

STINSON: 165 #372C. Brand new. 8 hours ferry time only. Primary blind panel and two-way radio. Near New York. Will sacrifice at $5000. Make offer. No trades. Apply Powers & George, 475 Fifth Avenue, New York, N. Y.

STINSON L-5 handsomely painted in red and silver. Fully equipped for night flying. Electric starter. New two-way radio, tires, tail wheel, battery. In excellent condition, hangared. $1400. F.Q. Hershey, Box 58,RFD2, Rochester, Michigan, phone 4608.

1947 STINSON Voyager 165, 333 hours, clock and all instruments, wheel pants, majored, 100 hr. inspections, relicensed, waxed. Never cracked privately owned by instructor pilot. New condition. $4600. B. L. Smick, Box 184, St John, Washington.

1947 STINSON 'Voyager', 103 hours, Aeromatic Prop. A nice clean airplane, never cracked and always hangared. Preston Motor Sales, Oneonta, N. Y.

STINSON 10-A, 100 hrs. since factory major. Superior condition. Navy instruments $1500. Orrin Deuel, Fashion Store, Eau Claire, Wis.

1946 STINSON 150 Voyager, blue, 135 hours. Privately owned, always hangared, just like new, all standard instrument plus sensitive altimeter, R of C; T&B; clock G.E. 2 way radio. Landing lights; flight hour meters; pants, $4,000. Boyd-Glomi, 5636 Delmar, St. Louis,Mo.

TAYLORCRAFT

1946 TAYLORCRAFT in real good condition, low time price $1300. Write Ronald Sandoz, Lakeside, Nebr.

EXCEPTIONAL 1946 BC-12-D. Stunning three color custom paint job. Unusual performance, cruises 110. Completely equipped, $3700 total investment, sacrifice for $2600. Write for details. 1945 Concord Road, Columbus, Ohio.

1946 TAYLORCRAFT Model BC-12-D. License November, 1948. Total time 50 hours. Ship like new. D. E. Mumbaugh, 4805 New Road, Youngstown 7, Ohio.

1946 TAYLORCRAFT, Blind group. Transceiver. Wing tanks, new condition, cruises 102, 144:55 honest time, $1650. James Stargel, 246 Whitmoor, Silver Spring, Md.

VULTEE

THREE place BT-13. Just licensed, all metal, make me an offer. F.B. Knepper, 1109 East Elm St., Tuscon, Arizona.

MISCELLANEOUS

LINK Trainer; C-3 factory modified to ANT-18, Glide Path, ADF, Wheels, Flaps, Prop Pitch. In new condition, 25 hours since factory re-built. Now operating. Perfect. $800. Vega Aviation Service, 108 East 5th St. at Robert, St Paul, Minn.

AIRPLANES. Send for free list all makes & models. World's largest stock and lowest prices. It's easy to buy from us, we do everything for you except pay for the airplane. Vest Aircraft Co., 4600 Dahlia, Denver, Colo.

BIRD. Licensed three place, $500. Milton Meerdink, 612 Ridgeway Ave., Rochester, New York. Glenwood 1-405-W.

47 FUNK Airplane, starter, lights, radio, thirteen hours by instructor, always hangared. $2750 or will trade for late car, tractor or Combine. Howard Phifer, Ulysses, Kansas.

AIRPLANES WANTED

PACKARD Dealer will trade new 1947 Packard Custom Eight 7 passenger Sedan for Navion or Bonanza. Black car with tan trim. Had radio, front and rear underseat heaters, dual defrosters, overdrive and electromatic clutch. List price, delivered includes taxes, accessories, transportation and license plates, $5165. This is a showroom car, which has never been licensed or used. Burdette Olson Motor Co., 478 W Michigan Ave., Kalamazoo, Mich. Phone 9668.

Will trade 46 GMC 522 Truck for four place plane. Truck like new. 20,000 miles. Moline Turkey Farm, Clinton V. Moline, Isanti, Minn.

PARTS AND ACCESSORIES

RADIO, Heath HBR-5 and loop, scarcely used, cost $79.00, sell $55.00. Whittlesey, 2 Wall St., New York, N.Y.

PRATT & Whitney R-1340 A-T-6 Engine 39 hours since major. George Prudom, 1004 Wilbarger, Vernon, Texas.

NAVION Owners. Add 10% to your cruising speed and range at no increas in power or fuel, install a CAA approved Tennes Navion Landing Gear Fairing Kit. Specify Hayes or Firestone wheel with order. Six hours installation time at any A & E shop. Net weight 8 lbs. Retail price, $130. Installation extra. H.E. Tennes, 801 Burlington Avenue, Downers Grove, Ill.

PROPELLER: Sensenich 70D42 never used, $35. John Urban, 224 Sullivan St., New York, N. Y.

AIRCRAFT Phone Transmitter, Maguire ART-1, 3105 Kcs. crystal controlled, 8 watts output, total weight including built-in power supply only 10 3/4 pounds, operates on 12 volts DC, $69 each FOB Globe Products Corp., P.O. Box 7, Bridgeport, Conn.

FOR Sale : Late type Wright used engine cylinders for J540-760 or 970; less than .003 taper, $15 each or 7 for $80, Saunders Motoro Company, Longview, Wash.

AVIATION EQUIPMENT

BARGAINS in war surplus instruments: Turn and Bank, Type A-8, $8.25; Directional Gyro Indicator, Type A-5, $8.75; Air Speed Indicator, $7.95. Write for listing. Delta Sales, P.O. Box 968, Shreveport, La.

CIVIL Air Patrol T shirts, beautifully designed in red, white, and blue. Cut-Rate Military Store, Fayetteville, North Carolina.

AAF FLYING suits, tan byrd cloth, zippered, $6.95. Mae West Life Jackets with CO2 cartridges, $2.75 B-6 Sheepskin Helmet, S-M-L $1.95. "Genuine" B-15 Jackets $14.95, Fischer Flying Goggles clear lens, $5.95, (AN6530), free catalog. Brunal Supply Co., 114 E. Edgar Rd., Linden, N.J. All new Mdse.

COMPUTERS, Dalton Model G, which straps to the leg, leaving one hand free, (formerly sold for $50) now only $7.50; Rolaire deluxe map cases for safe, easy pilotage, $14.95; AAF-type A-2 computer, $2; Weems plotter $2; New Model C American Airlines computer in leather case, with instructions, $5; E-6B Army computer, most widely used computer in aviation, $10 (with leather case & instructions); and from our large war surplus stock; Army D-12 aperiodic compasses for aircraft, airports and marine vessels, $12.50; astrocompasses, with instructions, new only $12.50; Longines pocket compasses for sport or work, new, $1.20. Dietzgen 6 inch protractors, 20¢; Elgin pocket stopwatches, like new, $12.75; Bausch & lomb sextants, $32.50; like new F-8 aerial cameras, a "best buy of the month" at $175; Dealer agencies open. (Free catalogue). Pan American Navigation Service, Dept F-1, 12021 Ventura Blvd. N. Hollywood, Calif.

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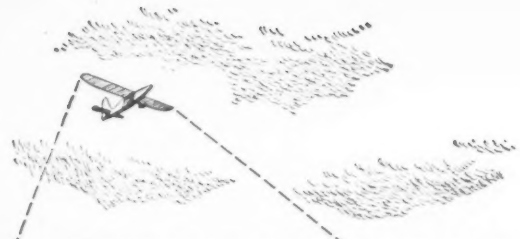

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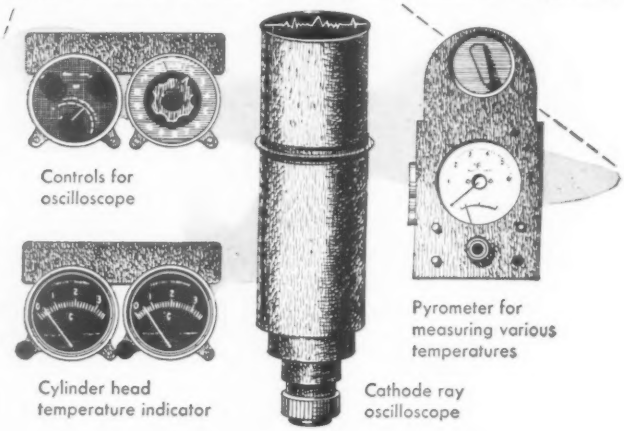

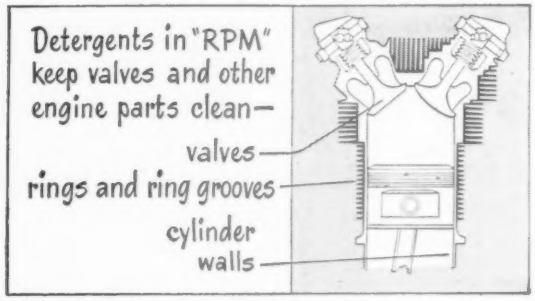

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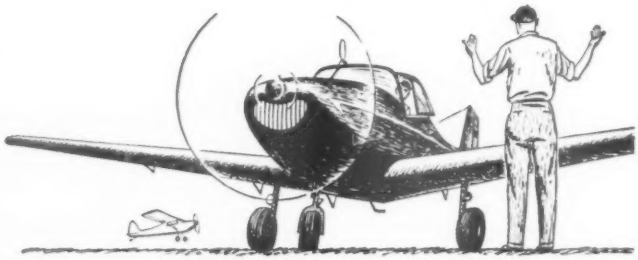

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Four Lives **and a new ship were at stake . . . but the *automatic* action of the AEROMATIC Propeller gave pilot Faulkner split-second full power with flat pitch. Split-second, automatic pitch is what counts in emergencies . . . it counts in normal operations, too.**

POWER LINES cut his final approach at the last minute! The pilot, Mr. Edward Faulkner, president of Faulkner Aviation Industries, was really up against it! He had a full load, no wind and an air speed of only 60 MPH! Here's his own story of what happened . . .

"WHILE fully loaded and giving a demonstration, I was coming in to land on an unfamiliar runway. I did not notice the power lines until they were directly in front of me. My air speed was only 60 MPH . . . I applied full throttle at once, attempting to clear the lines, or force my way through them. Our landing gear was caught momentarily on the wires . . . but we ended up in a normal landing . . . as though nothing had happened. No one was hurt. The damage was negligible. We all agreed that a serious crash had been averted due to the rugged stability and safety factors of the Bellanca Cruisair and the fact that *the Aeromatic Propeller immediately went into flat pitch and allowed us instant full power.* I continued my demonstration with the same passengers and, as a result, obtained five orders for planes, *all to be equipped with Aeromatic Propellers.*"

¼ SHORTER TAKE-OFF: Automatically, with the engine at full throttle, Aeromatic Propeller assumes low pitch. Gets plane off ground quickly with full take-off power.

⅓ HIGHER RATE OF CLIMB: Automatically responds to natural forces. Increases pitch as air speed rises. Gets plane to cruising level fast, on minimum fuel.

GREATER CRUISING RANGE AND SPEED: Automatically maintains the best pitch for top cruising on minimum fuel at any level up to critical altitude.

SAFER LANDINGS: Automatically adjusts its pitch for a long, flat glide. Moves to low pitch instantly for a quick pickup if pilot overshoots the field.

AEROMATICS are available for these planes . . . are being approved for other makes and models:

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SWIFT 125	BELLANCA CRUISAIR	RYAN NAVION
GRUMMAN WIDGEON	CESSNA 120 & 140	FAIRCHILD 24

also available for numerous foreign models

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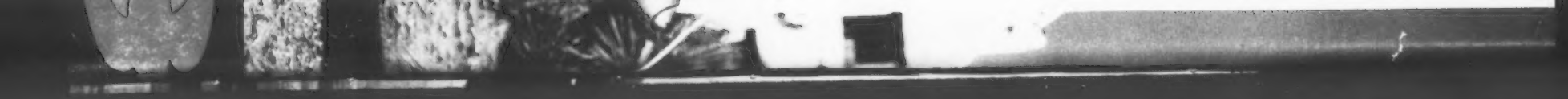
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